Master of Business Administration

(Open and Distance Learning Mode)

Semester – II

Financial Management

Centre for Distance and Online Education (CDOE)

DEVI AHILYA VISHWAVIDYALAYA, INDORE

"A+" Grade Accredited by NAAC

IET Campus, Khandwa Road, Indore - 452001

www.cdoedavv.ac.in

www.dde.dauniv.ac.in

Program Coordinator

Dr. Manishkant Arya
Centre for Distance and Online Education (CDOE)
Devi Ahilya Vishwavidyalaya, Indore – 452001

Content Design Committee

Dr. Sangita Jain
Institute of Management Studies
Devi Ahilya Vishwavidyalaya, Indore – 452001

Dr. Yamini Karmarkar
Institute of Management Studies
Devi Ahilya Vishwavidyalaya, Indore – 452001

Dr. Geeta Neema
International Institute of Professional Studies
Devi Ahilya Vishwavidyalaya, Indore – 452001

Dr. Manishkant Arya
Centre for Distance and Online Education (CDOE)
Devi Ahilya Vishwavidyalaya, Indore - 452001

Language Editors

Dr. Arti Sharan
Institute of Engineering & Technology
Devi Ahilya Vishwavidyalaya, Indore – 452001

Dr. Ruchi Singh
Institute of Engineering & Technology
Devi Ahilya Vishwavidyalaya, Indore – 452001

SLM Author(s)

Dr. Manishkant Arya
MBA, PhD
CDOE, Devi Ahilya Vishwavidyalaya, Indore – 452001

Ms. Shikha Jain
MBA
EMRC, Devi Ahilya Vishwavidyalaya, Indore – 452001

Edition : 2022 (Restricted Circulation)
Published by : Centre for Distance and Online Education (CDOE), Devi Ahilya Vishwavidyalaya
Printed at : University Press, Devi Ahilya Vishwavidyalaya, Indore – 452001

FINANCIAL MANAGEMENT

SYLLABI-BOOK MAPPING TABLE

Financial Management

Syllabi	Mapping in Book
Section-I Evolution of Financial-management, Scope and Objectives of Financial Management.	**Unit 1:** Nature of Financial Management **(Pages 5-23)**
Capital Budgeting: Capital Budgeting Process, Project Formulation & Project Selection, Introduction to Various Capital Budgeting Techniques; Payback Period Method, Average rate of return, Net Present Value method, IRR, Benefit-Cost Ratio, Capital Rationing.	**Unit 2:** Capital Budgeting Decisions **(Pages 25-80)**
Sources of Long Term Funds: Equity Shares, Preference Shares, Debentures, Public Deposits, Factors Affecting long Term Funds Requirements	**Unit 3:** Long-Term Finance **(Pages 81-103)**
Section-II ***Lease Financing:*** Concept, Types. Advantages and Disadvantages of Leasing.	**Unit 4:** Asset-based Financing: Lease, Hire Purchase and Project Financing **(Pages 105-123)**
Capital Structure: Determinants of Capital Structure, Capital Structure Theories, Cost of Capital, Operating and Financial Leverage.	**Unit 5:** Capital Structure: Theory and Policy **(Pages 127-173)** **Unit 6:** The Cost of Capital **(Pages 175-216)** **Unit 7:** Financial and Operating Leverage **(Pages 217-246)**
Working Capital: Concepts, Factors affecting Working Capital Requirements, Determining Working Capital Requirements, Sources of Working Capital.	**Unit 8:** Principles of Working Capital Mgt **(Pages 247-289)**
Section-III ***Management of Retained Earnings:*** Retained Earnings & Dividend Policy, Consideration in Dividend Policy, Forms of Dividends, Dividend Theories, Bonus Shares.	**Unit 9:** Dividend Theory **(Pages 293-316)** **Unit 10:** Dividend Policy **(Pages 317-342)**
Corporate Restructuring: Reasons and Factors Affecting Mergers, Acquisitions, Takeovers and Sell-offs'.	**Unit 11:** Corporate Restructuring, Mergers & Acquisitions **(Pages 343-395)**
Recent Developments—Introduction to Concepts of EVA, MVA, and CAPM.	**Unit 12:** Return, Risk and Shareholder Value **(Pages 397-433)**

CONTENTS

INTRODUCTION

NOTES

About three decades ago, the scope of financial management was confined to raising of funds. Little significance was attached to the analytical thinking in financial decision-making and problem solving. As a consequence, the finance text-books earlier were structured around this theme and contained description of the instruments and institutions of raising funds and of the major events, like promotion, reorganisation, readjustment, merger, consolidation etc., when funds were raised. In the mid-fifties, the emphasis shifted to the judicious utilisation of funds. The modern thinking in financial management accords a far greater importance to management decision-making and policy. Today, financial managers do not perform the passive role of scorekeepers of financial data and information, and arranging funds, whenever directed to do so. Rather, they occupy key positions in top management areas and play a dynamic role in solving complex management problems. They are now responsible for shaping the fortunes of the enterprise and are involved in the most vital management decision of allocation of capital. It is their duty to ensure that the funds are raised most economically and used in the most efficient and effective manner. Because of this change in emphasis, the descriptive treatment of the subject of financial management is being replaced by growing analytical content and sound theoretical underpinnings. This is the approach adopted by this book – *Financial Management*.

Focus of the Book

I wrote the first edition of Financial Management in 1978 with the following objectives which remain unchanged in the current edition in 2006:

1. To demonstrate to readers that the subject of finance is simple to understand, relevant in practice and interesting to learn.
2. To help managers appreciate the logic for making better financial decisions.
3. To explain the concepts and theories of finance in a simple way so readers could grasp them very easily and be able to put them into practice.
4. To provide a book that has a comprehensive coverage for MBA and other post-graduate courses.
5. To create a book that differentiates itself from other text- books in terms of coverage, presentation, and with an equal focus on theory and practice with real life examples.

Financial Management combines theory with practical applications. With a strong foundation, readers can easily understand the theories and methods, decision criteria, and financial policies and strategies necessary to manage funds and create and enhance the value of the firm.

Financial Management highlights the "modern", analytical approach to corporate finance decision-making. The text material has been structured to focus on finance theory and its implications in the financial decision-making process and policy. The book discusses the theories, concepts, assumptions, and mechanics underlying financial decisions. It also discusses sources and instruments of long-term finances, mergers and acquisitions, Importantly, the book helps students to relate theories and concepts to practice.

Features of the Book

Financial Management aims to assist the reader to develop a thorough understanding of the concepts and theories underlying financial management in a systematic way. To accomplish this purpose, the recent thinking in the field of finance has been presented in a most lucid, simple, unambiguous and precise manner.

The book contains a comprehensive treatment of topics on risk and return, capital budgeting, capital structure, dividend decisions, mergers and acquisitions, shareholder value, corporate governance with a view that readers understand these financial decisions thoroughly well and are able to evaluate their implications for shareholders and the company. The financial analysis, planning and modelling techniques are also discussed in detail for the benefit of those readers who have not been exposed to these topics earlier.

NOTES

In all its previous editions, the book has stressed the analytical approach for solving financial problems. Concepts are made clear in simple language before introducing complicated and sophisticated techniques and theories. For a better and easy comprehension of the concepts and theories, the book contains a number of real life financial problems and cases in the Indian context in addition to examples and illustrative problems. Each unit contains a summary of the key points as well as a list of key concepts. At the end of each unit, review questions and problems, a number of them based on professional courses and examinations have been added. Review questions can be used for discussions in the class by teachers. Problems have been included to help readers apply the concepts discussed in the chapter. Review questions and problems illustrate the key points in the text. Some questions and problems require readers to evaluate a situation or critically examine and analyse it. It is hoped that this will facilitate a better understanding of the subject matter.

The main features of the book may be summarised as follows:

1. Excel applications Proficiency with spreadsheets and Excel is a great advantage to financial analysts and managers and a necessity for all the post-graduate management, commerce and accounting courses students. With this in mind, at appropriate places, we created Excel Applications showing how spreadsheets with the help of Excel could be used to solve finance problems and decisions. These have also been identified in the list of Contents.
2. Web links for financial data Students, who are future managers, must know how to access financial data and information on the Internet. With this in mind, we have created a list of useful web links to help readers retrieve useful financial information.
3. Illustrative problems Finance decisions involve solving problems using the theoretical concepts. The book contains solved illustrations showing readers how concepts could be used to solve problems and take decisions.
4. Real life examples The book contains a large number of real life cases and examples to illustrate the practical applications of the finance theories and concepts.
5. Mini cases Most units include mini cases that reflect the applications of the conceptual material in the units. This is a new feature of the ninth edition of the book.
6. Key concepts For the benefits of readers, the key concepts of each unit have been listed at the end of the unit.

A large number of individuals have contributed in creating this book, *Financial Management*. I am thankful to all of them for their help and encouragement. Like most text-books, this book has also drawn from the works of a large number of researchers and authors in the field of finance. My writing in this book has also been influenced by a number of standard and popular text- books in the field. As far as possible, they have been fully acknowledged at the appropriate places. I express my gratitude to all of them. A number of problems, illustrations and exercises in the book have been drawn from or are based on the examinations of universities and management institutes in India as well as the public examinations of the professional bodies in India, the UK and the USA such as the Institute of Chartered Accountants of India, the Institute of Cost and Works Accountants of India, the Institute of Certified Public Accountants (CPA), USA, National Association of Accountants (NAA), USA, the Institute of Cost and Management Accounting (ICMA), UK. I have tried to give credit to all sources from where I have drawn material in this book. Still there may have remained unintended errors. I shall feel obliged if they are brought to my notice. I have also used published data of a number of companies in India. I am thankful to those companies also.

I express my gratitude to all my colleagues from universities, management schools and professional institutes in India and abroad for adopting the book, or for making suggestions for the improvement of the book, or for extending their support and encouragement.

I M PANDEY
Professor & Dean, School of Management,
Asian Institute of Technology, Klonluang,
Pathumthani 12120, Thailand
impandey@gmail.com

1 May, 2006

MODULE - 1

UNIT 1 NATURE OF FINANCIAL MANAGEMENT

NOTES

Structure

1.0 INTRODUCTION

Financial management is that managerial activity which is concerned with the planning and controlling of the firm's financial resources. It was a branch of economics till 1890, and as a separate discipline, it is of recent origin. Still, it has no unique body of knowledge of its own, and draws heavily on economics for its theoretical concepts even today.

The subject of financial management is of immense interest to both academicians and practising managers. It is of great interest to academicians because the subject is still developing, and there are still certain areas where controversies exist for which no unanimous solutions have been reached as yet. Practising managers are interested in this subject because among the most crucial decisions of the firm are those which relate to finance, and an understanding of the theory of financial management provides them with conceptual and analytical insights to make those decisions skilfully.

1.1 UNIT OBJECTIVES

- Explain the nature of finance and its interaction with other management functions
- Review the changing role of the finance manager and his/her position in the management hierarchy
- Focus on the shareholders' wealth maximisation (SWM) principle as an operationally desirable finance decision criterion

- Discuss agency problems arising from the relationship between shareholders and managers
- Illustrate organisation of finance function

NOTES

1.2 SCOPE OF FINANCE

What is finance? What are a firm's financial activities? How are they related to the firm's other activities? Firms create manufacturing capacities for production of goods; some provide services to customers. They sell their goods or services to earn profit. They raise funds to acquire manufacturing and other facilities. Thus, the three most important activities of a business firm are:

- production
- marketing
- finance

A firm secures whatever capital it needs and employs it (finance activity) in activities, which generate returns on invested capital (production and marketing activities).

1.2.1 Real and Financial Assets

A firm requires real assets to carry on its business. **Tangible real assets** are physical assets that include plant, machinery, office, factory, furniture and building. **Intangible real assets** include technical know-how, technological collaborations, patents and copyrights. **Financial assets,** also called securities, are financial papers or instruments such as shares and bonds or debentures. Firms issue securities to investors in the **primary capital markets** to raise necessary funds. The securities issued by firms are traded – bought and sold – by investors in the **secondary capital markets**, referred to as stock exchanges. Financial assets also include lease obligations and borrowing from banks, financial institutions and other sources. In a **lease**, the lessee obtains a right to use the lessor's asset for an agreed amount of rental over the period of lease. Funds applied to assets by the firm are called capital expenditures or investment. The firm expects to receive return on investment and might distribute return (or profit) as dividends to investors.

1.2.2 Equity and Borrowed Funds

There are two types of funds that a firm can raise: equity funds (simply called equity) and borrowed funds (called debt). A firm sells shares to acquire equity funds. **Shares** represent ownership rights of their holders. Buyers of shares are called shareholders (or stockholders), and they are the legal owners of the firm whose shares they hold. Shareholders invest their money in the shares of a company in the expectation of a return on their invested capital. The return of shareholders consists of dividend and capital gain. Shareholders make capital gains (or loss) by selling their shares.

Shareholders can be of two types: ordinary and preference. **Preference shareholders** receive dividend at a fixed rate, and they have a priority over **ordinary shareholders**. The dividend rate for ordinary shareholders is not fixed, and it can vary from year to year depending on the decision of the board of directors. The payment of dividends to shareholders is not a legal obligation; it depends on the discretion of the board of directors. Since ordinary shareholders receive dividend (or repayment of invested capital, only when the company is wound up) after meeting the obligations of others, they are generally called owners of residue. Dividends paid by a company are not deductible expenses for calculating corporate income taxes, and they are paid out of profits after corporate taxes. As per the current laws in India, a company is required to pay 12.5 per cent tax on dividends.

A company can also obtain equity funds by retaining earnings available for shareholders. Retained earnings, which could be referred to as internal equity, are undistributed profits of equity capital. The retention of earnings can be considered as a form of raising new capital. If a company distributes all earnings to shareholders, then, it can reacquire new capital from the same sources (existing shareholders) by issuing new shares called **rights shares.** Also, a **public issue** of shares may be made to attract new (as well as the existing) shareholders to contribute equity capital.

Another important source of securing capital is **creditors** or **lenders.** Lenders are not the owners of the company. They make money available to the firm as loan or debt and retain title to the funds

NOTES

lent. Loans are generally furnished for a specified period at a fixed rate of interest. For lenders, the return on loans or debt comes in the form of **interest** paid by the firm. Interest is a cost of debt to the firm. Payment of interest is a legal obligation. The amount of interest paid by a firm is a deductible expense for computing corporate income taxes. Thus, interest provides **tax shield** to a firm. The **interest tax shield** is valuable to a firm. The firm may borrow funds from a large number of sources, such as banks, financial institutions, public or by issuing bonds or debentures. A **bond** or a **debenture** is a certificate acknowledging the amount of money lent by a bondholder to the company. It states the amount, the rate of interest and the maturity of the bond or debenture. Since bond or debenture is a financial instrument, it can be traded in the secondary capital markets.

1.2.3 Finance and Management Functions

There exists an inseparable relationship between finance on the one hand and production, marketing and other functions on the other. Almost all business activities, directly or indirectly, involve the acquisition and use of funds. For example, recruitment and promotion of employees in production is clearly a responsibility of the production department; but it requires payment of wages and salaries and other benefits, and thus, involves finance. Similarly, buying a new machine or replacing an old machine for the purpose of increasing productive capacity affects the flow of funds. Sales promotion policies come within the purview of marketing, but advertising and other sales promotion activities require outlays of cash and therefore, affect financial resources.

Where is the separation between production and marketing functions on the one hand and the finance function of making money available to meet the costs of production and marketing operations on the other hand? Where do the production and marketing functions end and the finance function begin? There are no clear-cut answers to these questions. The finance function of raising and using money although has a significant effect on other functions, yet it needs not necessarily limit or constraint the general running of the business. A company in a tight financial position will, of course, give more weight to financial considerations, and devise its marketing and production strategies in the light of the financial constraint. On the other hand, management of a company, which has a reservoir of funds or a regular supply of funds, will be more flexible in formulating its production and marketing policies. In fact, financial policies will be devised to fit production and marketing decisions of a firm in practice.

1.3 FINANCE FUNCTIONS

It may be difficult to separate the finance functions from production, marketing and other functions, but the functions themselves can be readily identified. The functions of raising funds, investing them in assets and distributing returns earned from assets to shareholders are respectively known as *financing decision, investment decision and dividend decision.* A firm attempts to balance cash inflows and outflows while performing these functions. This is called *liquidity decision,* and we may add it to the list of important finance decisions or functions. Thus finance functions include:

- Long-term asset-mix or investment decision
- Capital-mix or financing decision
- Profit allocation or dividend decision
- Sort-term asset-mix or liquidity decision

A firm performs finance functions simultaneously and continuously in the normal course of the business. They do not necessarily occur in a sequence. Finance functions call for skilful planning, control and execution of a firm's activities.

Let us note at the outset that shareholders are made better off by a financial decision that increases the value of their shares. Thus while performing the finance functions, the financial manager should strive to maximise the market value of shares. This point is elaborated in detail later on in the unit.

Check Your Progress

1. What is the advantage enjoyed by financial assets vis-à-vis real assets in a business?
2. What are the main types of shareholder funds available to a company?
3. Which are the major ways in which a company may be able to raise new capital?
4. Why are borrowed funds often preferred over equity by firms to fund their businesses?

NOTES

1.3.1 Investment Decision

A firm's investment decisions involve capital expenditures. They are, therefore, referred as capital budgeting decisions. A **capital budgeting decision** involves the decision of allocation of capital or commitment of funds to long-term assets that would yield benefits (cash flows) in the future. Two important aspects of investment decisions are: (*a*) the evaluation of the prospective profitability of new investments, and (*b*) the measurement of a **cut-off rate** against that the prospective return of new investments could be compared. Future benefits of investments are difficult to measure and cannot be predicted with certainty. **Risk** in investment arises because of the uncertain returns. Investment proposals should, therefore, be evaluated in terms of both **expected return** and risk. Besides the decision to commit funds in new investment proposals, capital budgeting also involves **replacement decisions,** that is, decision of recommitting funds when an asset becomes less productive or non-profitable.

There is a broad agreement that the correct cut-off rate or the **required rate of return** on investments is the opportunity cost of capital.[1] The **opportunity cost of capital** is the expected rate of return that an investor could earn by investing his or her money in financial assets of equivalent risk. However, there are problems in computing the opportunity cost of capital in practice from the available data and information. A decision maker should be aware of these problems.

1.3.2 Financing Decision

Financing decision is the second important function to be performed by the financial manager. Broadly, he or she must decide when, where from and how to acquire funds to meet the firm's investment needs. The central issue before him or her is to determine the appropriate proportion of equity and debt. The mix of debt and equity is known as the firm's **capital structure**. The financial manager must strive to obtain the best financing mix or the **optimum capital structure** for his or her firm. The firm's capital structure is considered optimum when the market value of shares is maximised.

In the absence of debt, the shareholders' return is equal to the firm's return. The use of debt affects the return and risk of shareholders; it may increase the return on equity funds, but it always increases risk as well. The change in the shareholders' return caused by the change in the profits is called the **financial leverage.** A proper balance will have to be struck between return and risk. When the shareholders' return is maximised with given risk, the market value per share will be maximised and the firm's capital structure would be considered optimum. Once the financial manager is able to determine the best combination of debt and equity, he or she must raise the appropriate amount through the best available sources. In practice, a firm considers many other factors such as control, flexibility, loan covenants, legal aspects etc. in deciding its capital structure.

1.3.3 Dividend Decision

Dividend decision is the third major financial decision. The financial manager must decide whether the firm should distribute all profits, or retain them, or distribute a portion and retain the balance. The proportion of profits distributed as dividends is called the **dividend-payout ratio** and the retained portion of profits is known as the **retention ratio.** Like the debt policy, the dividend policy should be determined in terms of its impact on the shareholders' value. The **optimum dividend policy** is one that maximises the market value of the firm's shares. Thus, if shareholders are not indifferent to the firm's dividend policy, the financial manager must determine the optimum dividend-payout ratio. Dividends are generally paid in cash. But a firm may issue bonus shares. **Bonus shares** are shares issued to the existing shareholders without any charge. The financial manager should consider the questions of dividend stability, bonus shares and cash dividends in practice.

1. Robichek, A., *Financial Research and Management Decision,* John Wiley, 1967, p. 6.

NOTES

1.3.4 Liquidity Decision

Investment in current assets affects the firm's profitability and liquidity. Current assets management that affects a firm's liquidity is yet another important finance function. Current assets should be managed efficiently for safeguarding the firm against the risk of illiquidity. Lack of liquidity (or illiquidity) in extreme situations can lead to the firm's insolvency. A conflict exists between profitability and liquidity while managing current assets. If the firm does not invest sufficient funds in current assets, it may become illiquid and therefore, risky. But it would lose profitability, as idle current assets would not earn anything. Thus, a proper trade-off must be achieved between profitability and liquidity. The **profitability-liquidity trade-off** requires that the financial manager should develop sound techniques of managing current assets. He or she should estimate firm's needs for current assets and make sure that funds would be made available when needed.

In sum, financial decisions directly concern the firm's decision to acquire or dispose off assets and require commitment or recommitment of funds on a continuous basis. It is in this context that finance functions are said to influence production, marketing and other functions of the firm. Hence finance functions may affect the size, growth, profitability and risk of the firm, and ultimately, the value of the firm. To quote Ezra Solomon:[2]

... The function of financial management is to review and control decisions to commit or recommit funds to new or ongoing uses. Thus, in addition to raising funds, financial management is directly concerned with production, marketing and other functions, within an enterprise whenever decisions are made about the acquisition or distribution of assets.

1.3.5 Financial Procedures and Systems

For the effective execution of the finance functions, certain other functions have to be routinely performed. They concern procedures and systems and involve a lot of paper work and time. They do not require specialised skills of finance. Some of the important routine finance functions are:

- supervision of cash receipts and payments and safeguarding of cash balances
- custody and safeguarding of securities, insurance policies and other valuable papers
- taking care of the mechanical details of new outside financing
- record keeping and reporting

The finance manager in the modern enterprises is mainly involved in the managerial finance functions; executives at lower levels carry out the routine finance functions. Financial manager's involvement in the routine functions is confined to setting up of rules of procedures, selecting forms to be used, establishing standards for the employment of competent personnel and to check up the performance to see that the rules are observed and that the forms are properly used.

The involvement of the financial manager in the managerial financial functions is recent. About three decades ago, the scope of finance functions or the role of the financial manager was limited to routine activities. How the scope of finance function has widened or the role of the finance manager has changed is discussed in the following section.

1.4 FINANCIAL MANAGER'S ROLE

Who is a financial manager?[3] What is his or her role? A **financial manager** is a person who is responsible, in a significant way, to carry out the finance functions. It should be noted that, in a modern enterprise, the financial manager occupies a key position. He or she is one of the members of the top management team, and his or her role, day-by-day, is becoming more pervasive, intensive and significant in solving the complex funds management problems. Now his or her function is not confined to that of a scorekeeper maintaining records, preparing reports and

Check Your Progress

5. List the main areas of financial decision making.

2. Solomon, Ezra, *The Theory of Financial Management*, Columbia University Press, 1969, p. 3.
3. Different titles are used for the persons performing the finance functions. The title, financial manager, is more popular and easily understood. A discussion of the labels of financial executives follows later in this unit.

NOTES

raising funds when needed, nor is he or she a staff officer–in a passive role of an adviser. The finance manager is now responsible for shaping the fortunes of the enterprise, and is involved in the most vital decision of the allocation of capital. In his or her new role, he or she needs to have a broader and far-sighted outlook, and must ensure that the funds of the enterprise are utilised in the most efficient manner. He or she must realise that his or her actions have far-reaching consequences for the firm because they influence the size, profitability, growth, risk and survival of the firm, and as a consequence, affect the overall value of the firm. The financial manager, therefore, must have a clear understanding and a strong grasp of the nature and scope of the finance functions.

The financial manager has not always been in the dynamic role of decision-making. About three decades ago, he or she was not considered an important person, as far as the top management decision-making was concerned. He or she became an important management person only with the advent of the modern or contemporary approach to the financial management. What are the main functions of a financial manager?

1.4.1 Funds Raising

The traditional approach dominated the scope of financial management and limited the role of the financial manager simply to funds raising. It was during the major events, such as promotion, reorganisation, expansion or diversification in the firm that the financial manager was called upon to raise funds. In his or her day-to-day activities, his or her only significant duty was to see that the firm had enough cash to meet its obligations. Because of its central emphasis on the procurement of funds, the finance textbooks, for example, in the USA, till the mid1950s covered discussion of the instruments, institutions and practices through which funds were obtained. Further, as the problem of raising funds was more intensely felt in the special events, these books also contained detailed descriptions of the major events like mergers, consolidations, reorganisations and recapitalisations involving **episodic financing.**[4] The finance books in India and other countries simply followed the American pattern. The notable feature of the traditional view of financial management was the assumption that the financial manager had no concern with the decision of allocating the firm's funds. These decisions were assumed as given, and he or she was required to raise the needed funds from a combination of various sources.

The traditional approach did not go unchallenged even during the period of its dominance. But the criticism related more to the treatment of various topics rather than the basic definition of the finance function. The traditional approach has been criticised because it failed to consider the day-to-day managerial problems relating to finance of the firm. It concentrated itself to looking into the problems from management's–*the insider's point of view.*[5] Thus the traditional approach of looking at the role of the financial manager lacked a conceptual framework for making financial decisions, misplaced emphasis on raising of funds, and neglected the real issues relating to the allocation and management of funds.

1.4.2 Funds Allocation

The traditional approach outlived its utility in the changed business situation particularly after the mid-1950s. A number of economic and environmental factors, such as the increasing pace of industrialisation, technological innovations and inventions, intense competition, increasing intervention of government on account of management inefficiency and failure, population growth and widened markets, during and after mid-1950s, necessitated efficient and effective utilisation of the firm's resources, including financial resources. The development of a number of management skills and decision-making techniques facilitated the implementation of a system of optimum allocation of the firm's resources. As a result, the approach to, and the scope of financial management, also changed. The emphasis shifted from the episodic financing to the financial management, from raising of funds to efficient and effective use of funds. The new approach is embedded in sound conceptual and analytical theories.

4. For a detailed discussion, see Archer, S.M. and D'Ambrosio; S.A., *Business Finance: Theory and Practice,* Macmillan, 1966, Unit 1.
5. Solomon, *op. cit.,* p. 5.

NOTES

The new or modern approach to finance is an analytical way of looking into the financial problems of the firm. Financial management is considered a vital and an integral part of overall management. To quote Ezra Solomon:[6]

In this broader view the central issue of financial policy is the wise use of funds, and the central process involved is a rational matching of advantages of potential uses against the cost of alternative potential sources so as to achieve the broad financial goals which an enterprise sets for itself.

Thus, in a modern enterprise, the basic finance function is to decide about the expenditure decisions and to determine the demand for capital for these expenditures. In other words, the financial manager, in his or her new role, is concerned with the **efficient allocation of funds.** The allocation of funds is not a new problem, however. It did exist in the past, but it was not considered important enough in achieving the firm's long run objectives.

In his or her new role of using funds wisely, the financial manager must find a rationale for answering the following three questions:[7]

- How large should an enterprise be, and how fast should it grow?
- In what form should it hold its assets?
- How should the funds required be raised?

As discussed earlier, the questions stated above relate to three broad decision areas of financial management: investment (including both long and short-term assets), financing and dividend. The "modern" financial manager has to help making these decisions in the most rational way. They have to be made in such a way that the funds of the firm are used optimally. We have referred to these decisions as managerial finance functions since they require special care and extraordinary managerial ability.

As discussed earlier, the financial decisions have a great impact on all other business activities. The concern of the financial manager, besides his traditional function of raising money, will be on determining the size and technology of the firm, in setting the pace and direction of growth and in shaping the profitability and risk complexion of the firm by selecting the best asset mix and financing mix.

1.4.3 Profit Planning

The functions of the financial manager may be broadened to include profit-planning function. **Profit planning** refers to the operating decisions in the areas of pricing, costs, volume of output and the firm's selection of product lines. Profit planning is, therefore, a prerequisite for optimising investment and financing decisions.[8] The cost structure of the firm, i.e. the mix of fixed and variable costs has a significant influence on a firm's profitability. **Fixed costs** remain constant while **variable costs** change in direct proportion to volume changes. Because of the fixed costs, profits fluctuate at a higher degree than the fluctuations in sales. The change in profits due to the change in sales is referred to as **operating leverage**. Profit planning helps to anticipate the relationships between volume, costs and profits and develop action plans to face unexpected surprises.

1.4.4 Understanding Capital Markets

Capital markets bring investors (lenders) and firms (borrowers) together. Hence the financial manager has to deal with capital markets. He or she should fully understand the operations of capital markets and the way in which the capital markets value securities. He or she should also know-how risk is measured and how to cope with it in investment and financing decisions. For example, if a firm uses excessive debt to finance its growth, investors may perceive it as risky. The

6. *Ibid*., p. 2.
7. Solomon, *op. cit.,* pp. 8–9.
8. Mao, James C.T., *Quantitative Analysis of Financial Decisions,* Macmillan, 1969, p. 4.

NOTES

value of the firm's share may, therefore, decline. Similarly, investors may not like the decision of a highly profitable, growing firm to distribute dividend. They may like the firm to reinvest profits in attractive opportunities that would enhance their prospects for making high capital gains in the future. Investments also involve risk and return. It is through their operations in capital markets that investors continuously evaluate the actions of the financial manager.

1.5 FINANCIAL GOAL: PROFIT MAXIMISATION VERSUS WEALTH MAXIMISATION

The firm's investment and financing decisions are unavoidable and continuous. In order to make them rationally, the firm must have a goal. It is generally agreed in theory that the financial goal of the firm should be **shareholders' wealth maximisation** (SWM), as reflected in the market value of the firm's shares. In this section, we show that the shareholders' wealth maximisation is theoretically logical and operationally feasible **normative goal** for guiding the financial decision-making.

1.5.1 Profit Maximisation

Firms, producing goods and services, may function in a market economy, or in a government-controlled economy. In a market economy, prices of goods and services are determined in competitive markets. Firms in the market economy are expected to produce goods and services desired by society as efficiently as possible.

Price system is the most important organ of a market economy indicating what goods and services society wants. Goods and services in great demand command higher prices. This results in higher profit for firms; more of such goods and services are produced. Higher profit opportunities attract other firms to produce such goods and services. Ultimately, with intensifying competition, an equilibrium price is reached at which demand and supply match. In the case of goods and services, which are not required by society, their prices and profits fall. Producers drop such goods and services in favour of more profitable opportunities.[9] Price system directs managerial efforts towards more profitable goods or services. Prices are determined by the demand and supply conditions as well as the competitive forces, and they guide the allocation of resources for various productive activities.[10]

A legitimate question may be raised: Would the price system in a free market economy serve the interests of the society? Adam Smith has given the answer many years ago. According to him:[11]

(The businessman), by directing...industry in such a manner as its produce may be of greater value...intends only his own gain, and he is in this, as in many other cases, led by an invisible hand to promote an end which was not part of his intention...pursuing his own interest he frequently promotes that of society more effectually than he really intends to promote it.

Following Smith's logic, it is generally held by economists that under the conditions of free competition, businessmen pursuing their own self-interests also serve the interest of society. It is also assumed that when individual firms pursue the interest of maximising profits, society's resources are efficiently utilised.

In the economic theory, the behaviour of a firm is analysed in terms of profit maximisation. **Profit maximisation** implies that a firm either produces maximum output for a given amount of input, or uses minimum input for producing a given output. The underlying logic of profit maximisation is **efficiency.** It is assumed that profit maximisation causes the efficient allocation of resources under the competitive market conditions, and profit is considered as the most appropriate measure of a firm's performance.

Check Your Progress

6. What are the main tasks of the finance manager in today's business environment?

9. Solomon, Ezra and Pringle John J., *An Introduction to Financial Management,* Prentice-Hall of India, 1978, pp. 6–7.
10. *Ibid*.
11. Adam Smith, *The Wealth of Nations,* Modern Library, 1937, p. 423, quoted in Solomon and Pringle, *op. cit.*

NOTES

1.5.2 Objections to Profit Maximisation

The profit maximisation objective has been criticised. It is argued that profit maximisation assumes perfect competition, and in the face of imperfect modern markets, it cannot be a legitimate objective of the firm. It is also argued that profit maximisation, as a business objective, developed in the early 19th century when the characteristic features of the business structure were self-financing, private property and single entrepreneurship. The only aim of the single owner then was to enhance his or her individual wealth and personal power, which could easily be satisfied by the profit maximisation objective.[12] The modern business environment is characterised by limited liability and a divorce between management and ownership. Shareholders and lenders today finance the business firm but it is controlled and directed by professional management. The other important **stakeholders** of the firm are customers, employees, government and society. In practice, the objectives of these stakeholders or constituents of a firm differ and may conflict with each other. The manager of the firm has the difficult task of reconciling and balancing these conflicting objectives. In the new business environment, profit maximisation is regarded as unrealistic, difficult, inappropriate and immoral.[13]

It is also feared that profit maximisation behaviour in a market economy may tend to produce goods and services that are wasteful and unnecessary from the society's point of view. Also, it might lead to inequality of income and wealth. It is for this reason that governments tend to intervene in business. The price system and therefore, the profit maximisation principle may not work due to imperfections in practice. Oligopolies and monopolies are quite common phenomena of modern economies. Firms producing same goods and services differ substantially in terms of technology, costs and capital. In view of such conditions, it is difficult to have a truly competitive price system, and thus, it is doubtful if the profit-maximising behaviour will lead to the optimum social welfare. However, it is not clear that abandoning profit maximisation, as a decision criterion, would solve the problem. Rather, government intervention may be sought to correct market imperfections and to promote competition among business firms. A market economy, characterised by a high degree of competition, would certainly ensure efficient production of goods and services desired by society.[14]

Is profit maximisation an operationally feasible criterion? Apart from the aforesaid objections, profit maximisation fails to serve as an operational criterion for maximising the owner's economic welfare. It fails to provide an operationally feasible measure for ranking alternative courses of action in terms of their economic efficiency. It suffers from the following limitations:[15]

- It is vague
- It ignores the timing of returns
- It ignores risk.

Definition of profit: The precise meaning of the profit maximisation objective is unclear. The definition of the term profit is ambiguous. Does it mean short- or long-term profit? Does it refer to profit before or after tax? Total profits or profit per share? Does it mean total operating profit or profit accruing to shareholders?

Time value of money: The profit maximisation objective does not make an explicit distinction between returns received in different time periods. It gives no consideration to the time value of money, and it values benefits received in different periods of time as the same.

Uncertainty of returns: The streams of benefits may possess different degree of certainty. Two firms may have same total expected earnings, but if the earnings of one firm fluctuate considerably as compared to the other, it will be more risky. Possibly, owners of the firm would prefer smaller but surer profits to a potentially larger but less certain stream of benefits.

12. Solomon, *op. cit.*
13. Anthony, Robert B., The Trouble with Profit Maximization, *Harvard Business Review,* 38, (Nov.–Dec. 1960), pp. 126–34.
14. Solomon and Pringle, *op. cit.,* pp. 8–9.
15. Solomon, *op. cit.,* p. 19.

NOTES

1.5.3 Maximising Profit After Taxes

Let us put aside the first problem mentioned above, and assume that maximising profit means maximising profits after taxes, in the sense of net profit as reported in the profit and loss account (income statement) of the firm. It can easily be realised that maximising this figure will not maximise the economic welfare of the owners. It is possible for a firm to increase profit after taxes by selling additional equity shares and investing the proceeds in low-yielding assets, such as the government bonds. Profit after taxes would increase but **earnings per share** (EPS) would decrease. To illustrate, let us assume that a company has 10,000 shares outstanding, profit after taxes of Rs 50,000 and earnings per share of Rs 5. If the company sells 10,000 additional shares at Rs 50 per share and invests the proceeds (Rs 500,000) at 5 per cent after taxes, then the total profits after taxes will increase to Rs 75,000. However, the earnings per share will fall to Rs 3.75 (i.e., Rs 75,000/20,000). This example clearly indicates that maximising profits after taxes does not necessarily serve the best interests of owners.

1.5.4 Maximising EPS

If we adopt maximising EPS as the financial objective of the firm, this will also not ensure the maximisation of owners' economic welfare. It also suffers from the flaws already mentioned, i.e. it ignores timing and risk of the expected benefits. Apart from these problems, maximisation of EPS has certain deficiencies as a financial objective. For example, note the following observation:[16]

... For one thing, it implies that the market value of the company's shares is a function of earnings per share, which may not be true in many instances. If the market value is not a function of earnings per share, then maximisation of the latter will not necessarily result in the highest possible price for the company's shares. Maximisation of earnings per share further implies that the firm should make no dividend payments so long as funds can be invested internally at any positive rate of return, however small. Such a dividend policy may not always be to the shareholders' advantage.

It is, thus, clear that maximising profits after taxes or EPS as the financial objective fails to maximise the economic welfare of owners. Both methods do not take account of the timing and uncertainty of the benefits. An alternative to profit maximisation, which solves these problems, is the objective of **wealth maximisation.** This objective is also considered consistent with the survival goal and with the personal objectives of managers such as recognition, power, status and personal wealth.

1.5.5 Shareholders' Wealth Maximisation (SWM)

What is meant by shareholders' wealth maximisation (SWM)? SWM means maximising the net present value of a course of action to shareholders. **Net present value** (NPV) or wealth of a course of action is the difference between the present value of its benefits and the present value of its costs.[17] A financial action that has a positive NPV creates wealth for shareholders and, therefore, is desirable. A financial action resulting in negative NPV should be rejected since it would destroy shareholders' wealth. Between **mutually exclusive projects** the one with the highest NPV should be adopted. NPVs of a firm's projects are addititive in nature. That is

$$\text{NPV}(A) + \text{NPV}(B) = \text{NPV}(A+B)$$

This is referred to as the **principle of value-additivity.** Therefore, the wealth will be maximised if NPV criterion is followed in making financial decisions.[18]

16. Porterfield, James C.T., *Investment Decision and Capital Costs,* Prentice-Hall, 1965.
17. Solomon, *op. cit.,* p. 22.
18. The net present value or wealth can be defined more explicitly in the following way:

$$\text{NPV} = W = \frac{C_1}{(1+k)} + \frac{C_2}{(1+k)^2} + \ldots \frac{C_n}{(1+k)^n} - C_0 = \sum_{t-1}^{n} \frac{C_t}{(1+k)^t} - C_0$$

where C_1, C_2 ... represent the stream of cash flows (benefits) expected to occur if a course of action is

Contd...

The objective of SWM takes care of the questions of the timing and risk of the expected benefits. These problems are handled by selecting an appropriate rate (the shareholders' opportunity cost of capital) for discounting the expected flow of future benefits. *It is important to emphasise that benefits are measured in terms of* ***cash flows.*** In investment and financing decisions, it is the flow of cash that is important, not the accounting profits.

The objective of SWM is an appropriate and operationally feasible criterion to choose among the alternative financial actions. It provides an unambiguous measure of what financial management should seek to maximise in making investment and financing decisions on behalf of shareholders.[19]

Maximising the shareholders' economic welfare is equivalent to maximising the utility of their consumption over time. With their wealth maximised, shareholders can adjust their cash flows in such a way as to optimise their consumption. From the shareholders' point of view, the wealth created by a company through its actions is reflected in the market value of the company's shares. Therefore, the wealth maximisation principle implies that the *fundamental objective of a firm is to maximise the market value of its shares*. The value of the company's shares is represented by their market price that, in turn, is a reflection of shareholders' perception about quality of the firm's financial decisions. The market price serves as the firm's performance indicator. How is the market price of a firm's share determined?

1.5.6 Need for a Valuation Approach

SWM requires a valuation model. The financial manager must know or at least assume the factors that influence the market price of shares, otherwise he or she would find himself or herself unable to maximise the market value of the company's shares. What is the appropriate share valuation model? In practice, innumerable factors influence the price of a share, and also, these factors change very frequently. Moreover, these factors vary across shares of different companies. For the purpose of the financial management problem, we can phrase the crucial questions normatively: How much *should* a particular share be worth? Upon what factor or factors *should* its value depend? Although there is no simple answer to these questions, it is generally agreed that the value of an asset depends on its risk and return.

1.5.7 Risk-return Trade-off

Financial decisions incur different degree of risk. Your decision to invest your money in government bonds has less risk as interest rate is known and the **risk of default** is very less. On the other hand, you would incur more risk if you decide to invest your money in shares, as return is not certain. However, you can *expect* a lower return from government bond and higher from shares. Risk and expected return move in tandem; the greater the risk, the greater the expected return. Figure 1.1 shows this **risk-return relationship.**

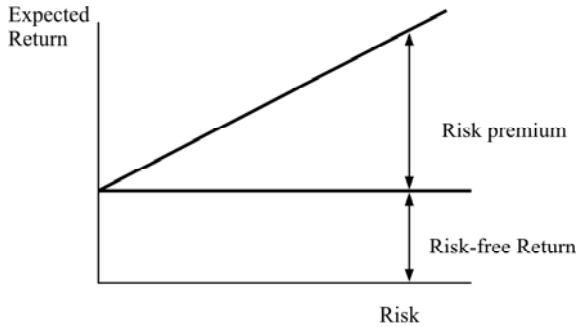


Figure 1.1: The risk-return relationship

adopted, C_0 is the cash outflow (cost) of that action and k is the appropriate discount rate (opportunity cost of capital) to measure the quality of C's; k reflects both timing and risk of benefits, and W is the net present value or wealth which is the difference between the present value of the stream of benefits and the initial cost. The firm should adopt a course of action only when W is positive, i.e. when there is net increase in the wealth of the firm. This is a very simple model of expressing wealth maximisation principle. A complicated model can assume capital investments to occur over a period of time and k to change with time.

19. Solomon, *op. cit.*, p. 20.

NOTES

Financial decisions of the firm are guided by the **risk-return trade-off.** These decisions are interrelated and jointly affect the market value of its shares by influencing return and risk of the firm. The relationship between return and risk can be simply expressed as follows:

$$\text{Return} = \text{Risk-free rate} + \text{Risk premium} \quad (1)$$

Risk-free rate is a rate obtainable from a default-risk free government security. An investor assuming risk from her investment requires a **risk premium** above the risk-free rate. Risk-free rate is a compensation for time and risk premium for risk. Higher the risk of an action, higher will be the risk premium leading to higher required return on that action. A proper balance between return and risk should be maintained to maximise the market value of a firm's shares. Such balance is called risk-return trade-off, and every financial decision involves this trade-off. The interrelation between market value, financial decisions and risk-return trade-off is depicted in Figure 1.2. It also gives an overview of the functions of financial management.

The financial manager, in a bid to maximise shareholders' wealth, should strive to maximise returns in relation to the given risk; he or she should seek courses of actions that avoid unnecessary risks. To ensure maximum return, funds flowing in and out of the firm should be constantly monitored to assure that they are safeguarded and properly utilised. The financial reporting system must be designed to provide timely and accurate picture of the firm's activities.

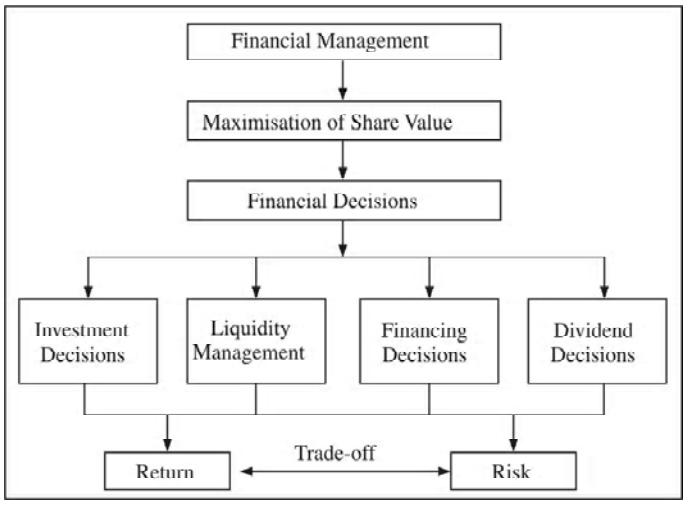


Figure 1.2: An overview of financial management

1.6 AGENCY PROBLEMS: MANAGER'S VERSUS SHAREHOLDERS' GOALS

In large companies, there is a divorce between management and ownership. The decision-taking authority in a company lies in the hands of managers. Shareholders as owners of a company are the principals and managers are their agents. Thus there is a **principal-agent relationship** between shareholders and managers. In theory, managers should act in the best interests of shareholders; that is, their actions and decisions should lead to SWM. In practice, managers may not necessarily act in the best interest of shareholders, and they may pursue their own personal goals. Managers may maximise their own wealth (in the form of high salaries and perks) at the cost of shareholders, or may play safe and create satisfactory wealth for shareholders than the maximum. They may avoid taking high investment and financing risks that may otherwise be needed to maximise shareholders' wealth. Such "satisficing" behaviour of managers will frustrate the objective of SWM as a *normative guide*. It is in the interests of managers that the firm survives over the long run. Managers also wish to enjoy independence and freedom from outside interference, control and monitoring. Thus their actions are very likely to be directed

Check Your Progress

7. What should be financial goal of a firm?
8. Why are indicators like profits after taxes and earnings per share not the best ways to decide financial goals of a firm?

towards the goals of survival and self-sufficiency[20]. Further, a company is a complex organisation consisting of multiple stakeholders such as employees, debt-holders, consumers, suppliers, government and society. Managers in practice may, thus, perceive their role as reconciling conflicting objectives of stakeholders. This stakeholders' view of managers' role may compromise with the objective of SWM.

Shareholders continuously monitor modern companies that would help them to restrict managers' freedom to act in their own self-interest at the cost of shareholders. Employees, creditors, customers and government also keep an eye on managers' activities. Thus the possibility of managers pursuing *exclusively* their own personal goals is reduced. Managers can survive only when they are successful; and they are successful when they manage the company better than someone else. Every group connected with the company will, however, evaluate management success from

EXHIBIT 1.1: BHEL'S MISSION AND OBJECTIVES

BHEL defines its vision, mission, values and objectives as follows:

- ***Vision*** To become a world class, innovative, competitive and profitable engineering enterprise providing total business solutions.
- ***Business mission*** To be the leading Indian engineering enterprise providing quality products, systems and services in the fields of energy, transportation, industry, infrastructure and other potential areas.
- ***Values***
  - Meeting commitments made to external and internal customers.
  - Fostering learning, creativity and speed of response.
  - Respect for dignity and potential of individuals.
  - Loyalty and pride in the company.
  - Team playing.
  - Zeal to excel.
  - Integrity and fairness in all matters.
- ***Objectives*** BHEL defines its objectives as follows:
  - ***Growth*** To ensure a steady growth by enhancing the competitive edge of BHEL in existing business, new areas and international operations so as to fulfil national expectations for BHEL.
  - ***Profitability*** To provide a reasonable and adequate return on capital employed, primarily through improvements in operational efficiency, capacity utilisation and productivity, and generate adequate internal resources to finance the company's growth.
  - ***Customer focus*** To build a high degree of customer confidence by providing increased value for his money through international standards of product quality, performance and superior customer service.
  - ***People orientation*** To enable each employee to achieve his potential, improve his capabilities, perceive his role and responsibilities and participate and contribute positively to the growth and success of the company. To invest in human resources continuously and be alive to their needs.
  - ***Technology*** To achieve technological excellence in operations by development of indigenous technologies and efficient absorption and adaptation of imported technologies to sustain needs and priorities, and provide a competitive advantage to the company.
  - ***Image*** To fulfil the expectations which shareholders like government as owner, employees, customers and the country at large have from BHEL.

Source : BHEL's Annual Reports.

20. Donaldson, G., *Managing Corporate Wealth: The Operations of a Comprehensive Financial Goals System*, New York : Praeger, 1984.

NOTES

the point of view of the fulfilment of its own objective. The survival of management will be threatened if the objective of any of these groups remains unfulfilled. In reality, the wealth of shareholders in the long run could be maximised only when customers and employees, along with other stakeholders of a firm, are fully satisfied. The wealth maximisation objective may be generally in harmony with the interests of the various groups such as owners, employees, creditors and society, and thus, it may be consistent with the management objective of survival.[21] There can, however, still arise situations where a conflict may occur between the shareholders' and managers' goals. Finance theory prescribes that under such situations, shareholders wealth maximisation goal should have precedent over the goals of other stakeholders.

The conflict between the interests of shareholders and managers is referred to as **agency problem** and it results into agency costs. **Agency costs** include the less than optimum share value for shareholders and costs incurred by them to monitor the actions of managers and control their behaviour. The agency problems vanish when managers own the company. Thus one way to mitigate the agency problems is to give ownership rights through stock options to managers. Shareholders can also offer attractive monetary and non-monetary incentives to managers to act in their interests. A close monitoring by other stakeholders, board of directors and outside analysts also may help in reducing the agency problems. In more capitalistic societies such as USA and UK, the takeovers and acquisitions are used as means of disciplining managers.

1.7 FINANCIAL GOAL AND FIRM'S MISSION AND OBJECTIVES

In SWM, wealth is defined in terms of wealth or value of the shareholders' equity. This basis of the theory of financial management is same as that of the classical theory of the firm: maximisation of owners' welfare. In the professionally managed firms of our times, managers are the agents of owners and act on their behalf.

SWM is a criterion for financial decisions, and therefore, valuation models provide the basic theoretical and conceptual framework. Is wealth maximisation the *objective of the firm?* Does a firm exist with the sole objective of serving the interests of owners? Firms do exist with the primary objective of maximising the welfare of owners, but, in operational terms, they always focus on the satisfaction of its customers through the production of goods and services needed by them. As Drucker puts it:[22]

What is our business is not determined by the producer, but by the consumer. It is not defined by the company's name, statutes or articles of incorporation, but by the want the consumer satisfies when he buys a product or a service. The question can therefore be answered only by looking at the business from the outside, from the point of view of the customer and the market.

Firms in practice state their vision, mission and values in broad terms, and are also concerned about technology, leadership, productivity, market standing, image, profitability, financial resources, employees' satisfaction etc. For example, BHEL, a large Indian company with sales of Rs 72.87 billion (Rs 7,287 crore),[23] net assets of Rs 92.97 billion (Rs 9,297 crore) and a profit after tax of Rs 4.68 billion (Rs 468 crore) for the year 2001–02 and employing 47,729 employees states its multiple objectives in terms of leadership, growth, profitability, consumer satisfaction, employees needs, technology and image (see Exhibit 1.1). The stated financial goals of the firm are: (*a*) sales growth; (*b*) reasonable return on capital; and (*c*) internal financing.

Objectives vs. decision criteria Objectives and decision criteria should be distinguished. Wealth maximisation is more appropriately a *decision criterion*, rather than an *objective or a goal*.[24] **Goals** or **objectives** are missions or basic purposes – raison deter of a firm's existence. They direct the firm's actions. A firm may consider itself a provider of high technology, a builder of electronic base, or

Check Your Progress

9. When could an agency problem arise while managing a business?
10. What could be the adverse results of an agency problem?

21. For a detailed discussion, see Solomon, *op. cit.*
22. Drucker, Peter, *The Practice of Management*, Pan Books, 1968, p. 67.
23. 1 crore = 10 million; 10 lakh = 1 million; 1 lakh = 100 thousand.
24. Some people make a difference between objectives and goals. We use them interchangeably here.

a provider of best and cheapest transport services. The firm designs its **strategy** around such basic objectives and accordingly, defines its markets, products and technology. To support its strategy, the firm lays down **policies** in the areas of production, purchase, marketing, technology, finance and so on.[25]

The first step in making a decision is to see that it is consistent with the firm's strategy and passes through the policy screening. The shareholders' wealth maximisation is the second-level criterion ensuring that the decision meets the minimum standard of the economic performance. It is important to note that the management is not only the *agent* of owners, but also *trustee* for various stakeholders (constituents) of an economic unit. It is the responsibility of the management to harmonise the interests of owners with that of the employees, creditors, government, or society. In the final decision-making, the judgment of management plays the crucial role. The wealth maximisation criterion would simply indicate whether an action is economically viable or not.

NOTES

1.8 ORGANISATION OF THE FINANCE FUNCTIONS

The vital importance of the financial decisions to a firm makes it imperative to set up a sound and efficient organisation for the finance functions. The ultimate responsibility of carrying out the finance functions lies with the top management. Thus, a department to organise financial activities may be created under the direct control of the board of directors. The board may constitute a finance committee. The executive heading the finance department is the firm's **chief finance officer** (CFO), and he or she may be known by different designations. The finance committee or CFO will decide the major financial policy matters, while the routine activities would be delegated to lower levels. For example, at BHEL a director of finance at the corporate office heads the finance function. He is a member of the board of directors and reports to the chairman and managing director (CMD). An executive director of finance (EDF) and a general manager of finance (GMF) assist the director of finance. EDF looks after funding, budgets and cost, books of accounts, financial services and cash management. GMF is responsible for internal audit and taxation.

The reason for placing the finance functions in the hands of top management may be attributed to the following factors: *First,* financial decisions are crucial for the survival of the firm. The growth and development of the firm is directly influenced by the financial policies. *Second,* the financial actions determine solvency of the firm. At no cost can a firm afford to threaten its solvency. Because solvency is affected by the flow of funds, which is a result of the various financial activities, top management being in a position to coordinate these activities retains finance functions in its control. *Third,* centralisation of the finance functions can result in a number of economies to the firm. For example, the firm can save in terms of interest on borrowed funds, can purchase fixed assets economically or issue shares or debentures efficiently.

1.8.1 Status and Duties of Finance Executives

The exact organisation structure for financial management will differ across firms. It will depend on factors such as the size of the firm, nature of the business, financing operations, capabilities of the firm's financial officers and most importantly, on the financial philosophy of the firm. The designation of the chief financial officer (CFO) would also differ within firms. In some firms, the financial officer may be known as the financial manager, while in others as the vice-president of finance or the director of finance or the financial controller. Two more officers—**treasurer** and **controller**—may be appointed under the direct supervision of CFO to assist him or her. In larger companies, with modern management, there may be vice-president or director of finance, usually with both controller and treasurer reporting to him.[26]

Check Your Progress

11. In addition to the goal of wealth maximization, what could be other objectives of a firm?

Figure 1.3 illustrates the financial organisation of a large (hypothetical) business firm. It is a simple organisation chart, and as stated earlier, the exact organisation for a firm will depend on its circumstances. Figure 1.3 reveals that the finance function is one of the major functional areas,

25. Solomon and Pringle, *op. cit.*

26. Cohen, J.B. and Robbins, S.M., *The Financial Manager,* Harper and Row, 1966, pp. 11–12.

NOTES

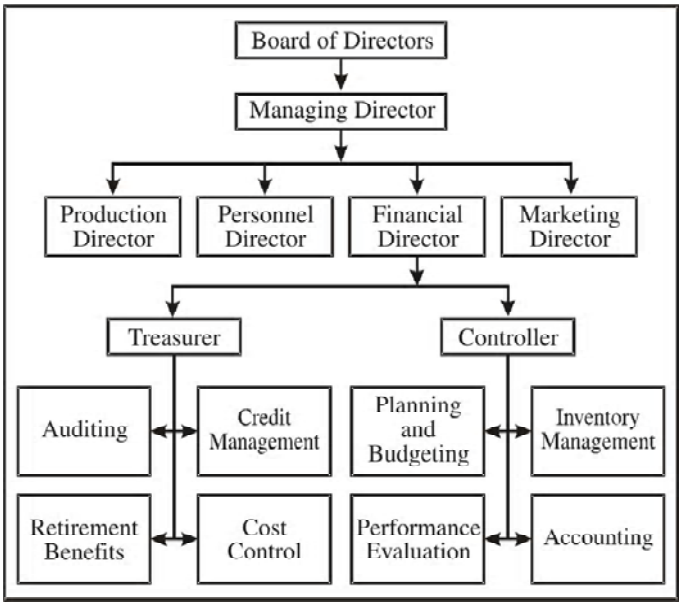


Figure 1.3: Organisation for finance function

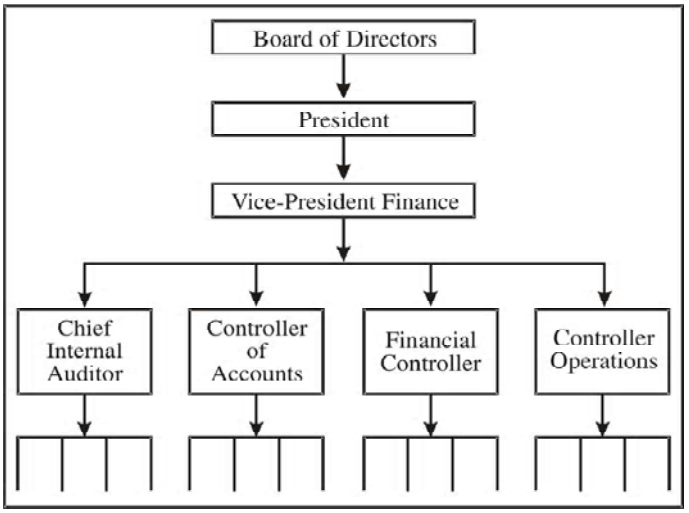


Figure 1.4: Organisation for finance function in a multi-divisional company

and the financial manager or director is under the control of the board of directors. Figure 1.4 shows the organisation for the finance function of a large, multi-divisional Indian company.

CFO has both line and staff responsibilities. He or she is directly concerned with the financial planning and control. He or she is a member of the top management, and he or she is closely associated with the formulation of policies and making decisions for the firm. The treasurer and controller, if a company has these executives, would operate under CFO's supervision. He or she must guide them and others in the effective working of the finance department.

The main function of the treasurer is to manage the firm's funds. His or her major duties include forecasting the financial needs, administering the flow of cash, managing credit, floating securities, maintaining relations with financial institution and protecting funds and securities. On the other hand, the functions of the controller relate to the management and control of assets. His or her duties include providing information to formulate accounting and costing policies, preparation of financial reports, direction of internal auditing, budgeting, inventory control, taxes etc. It may be stated that the controller's functions concentrate the asset side of the balance sheet, while treasurer's functions relate to the liability side.

NOTES

1.8.2 Controller's and Treasurer's Functions in the Indian Context

The controller and the treasurer are essentially American terms. Generally speaking, the American pattern of dividing the financial executive's functions into controllership and treasurership functions is not being widely followed in India. We do have a number of companies in India having officers with the designation of the controller, or the financial controller. The controller or the financial controller in India, by and large, performs the functions of a chief accountant or management accountant. The officer with the title of treasurer can also be found in a few companies in India.

The controllership functions, as stated by the Financial Executives' Institute of the USA, can prove to be useful under the Indian context. But presently the **company secretary** in India performs some of these duties. His or her duties, for example, include asset control and protection, maintaining records and preparing reports and government reporting. The economic appraisal function is generally performed at the top level in India. Some companies do have separate economics and statistical departments for this purpose. Some other functions, such as internal audit, can be brought within the fold of the controllership functions, if this concept is developed in the Indian context.

It should be realised that the financial controller *does not* control finances; he or she develops, uses and interprets information—some of which will be financial in nature—for management control and planning. For this reason, the financial controller may simply be called as the controller. Management of finance or money is a separate and important activity. Traditionally, the accountants have been involved in managing money in India. But the difference in managing money resources and information resources should be appreciated.

In the American business, the management of finance is treated as a separate activity and is being performed by the treasurer. The title of the treasurer has not found favour in India to the extent the controller has. The company secretary in India discharges some of the functions performed by the treasurer in the American context. Insurance coverage is an example in this regard. The function of maintaining relations with investors (particularly shareholders) may now assume significance in India because of the development in the Indian capital markets and the increasing awareness among investors.

The general title, financial manager or finance director, seems to be more popular in India. This title is also better than the title of treasurer since it conveys the functions involved. The main function of the financial manager in India should be the management of the company's funds. The financial duties may often be combined with others. But the significance of not combining the financial manager's duties with others should be realised. The managing of funds—a very valuable resource—is a business activity requiring extraordinary skill on the part of the financial manager. He or she should ensure the optimum use of money under various constraints. He or she should, therefore, be allowed to devote his or her full energy and time in managing the money resources only.

1.9 LET US SUMMARIZE

1. The finance functions can be divided into three broad categories: (1) investment decision, (2) financing decision, and (3) dividend decision. In other words, the firm decides how much to invest in short-term and long-term assets and how to raise the required funds.
2. In making financial decisions, the financial manager should aim at increasing the value of the shareholders' stake in the firm. This is referred to as the principle of shareholders' wealth maximisation (SWM).
3. Wealth maximisation is superior to profit maximisation since wealth is precisely defined as net present value and it accounts for time value of money and risk.
4. Shareholders and managers have the principal-agent relationship. In practice, there may arise a conflict between the interests of shareholders and managers. This is referred to the agency problem and the associated costs are called agency costs. Offering ownership rights (in the form of stock options) to managers can mitigate agency costs.

Check Your Progress

12. What are the major roles that the Chief Finance Officer (CFO) of a firm is expected to play in today's business environment?

NOTES

5. The financial manager raises capital from the capital markets. He or she should therefore know-how the capital markets function to allocate capital to the competing firms and how security prices are determined in the capital markets.
6. Most companies have only one chief financial officer (CFO). But a large company may have both a treasurer and a controller, who may or may not operate under CFO.
7. The treasurer's function is to raise and manage company funds while the controller oversees whether funds are correctly applied. A number of companies in India either have a finance director or a vice-president of finance as the chief financial officer.

1.10 KEY CONCEPTS

Agency costs
Assets
Bond
Bonus shares
Capital expenditure
Capital markets
Capital structure
Controller
Cut-off rate
Debenture
Dividend decision
Dividend payout
Earnings per share (EPS)
Episodic financing
Financial asset
Financial leverage
Financing decision
Fixed costs
Goals
Intangible real assets
Interest tax shield
Investment decision
Liquidity decision
Net present value
Objectives
Opportunity cost of capital
Operating leverage
Optimum capital structure
Owners of residue
Policies
Preference share capital
Primary markets
Profit maximisation
Profit planning
Real assets
Required rate of return
Return on investment
Rights issue
Risk
Risk-free rate
Risk premium
Risk-return trade-off
Secondary markets
Securities
Shareholders' wealth maximisation
Shares
Stock dividend
Strategy
Tangible real assets
Treasurer
Valuation model
Variable costs
Wealth
Wealth maximisation

1.11 ANSWERS TO 'CHECK YOUR PROGRESS'

1. Financial assets like shares and bonds can be bought or sold more easily. Real assets like plant and machinery, building etc. are not as liquid as financial assets are.
2. Mostly equity funds consisting of ordinary shares and undistributed profits (retained earnings) but also preference shares.
3. By issuing new shares to the general public as well as by issuing new shares to existing shareholders which are known as rights shares.
4. A firm borrows money from lenders; they are not owners of the business. There are three reasons for preferring borrowed funds: (1) Unlike dividends on shareholder funds, the amount of interest paid on borrowed funds by a firm saves taxes as it is treated as a deductible expense while computing income tax payable by a firm. (2) The shareholder return will be higher if the interest rate on borrowed funds is less than return from assets or business. (3) It is relatively easy to raise borrowed funds from a financial institution or bank than issuing equity funds.
5. The main areas of financial decision making are (1) the investment decision (or capital budgeting decision), (2) the financing decision (or capital structure decision), (3) the dividend decision (or profit allocation decision) and (4) the liquidity decision (or working capital management decision).
6. A finance manager is responsible for carrying out the firm's finance functions. This includes raising funds as well as allocation of funds in an efficient manner. He is also part of the profit planning process.

7. The main financial goal of a firm is to create value for shareholders by maximizing the wealth of shareholders.
8. This is because measures like profits after taxes and earnings per share ignore timing of returns and also ignore risks. The timing of returns is important as the time value of money changes depending on when the value of benefits is received. Further, the streams of benefits may possess different degrees of uncertainty.
9. Managers are agents of shareholders. An agency problem may arise when managers top acting in the best interests of shareholders and start pursuing their own goals.
10. An agency problem will result in agency costs. These costs include lowering of shareholder value as well as costs incurred by shareholders to monitor the actions of managers.
11. For long term viability of a firm, the management has to harmonise the interests of the shareholders with other stakeholders of the business. These include customers, employees, creditors, government and society. Various objectives of a firm could include factors such as achieving desired rate of growth, improving customer service, maintaining technology excellence, building brand image, etc. However, decisions have to be taken keeping the long term wealth maximization criterion in mind.
12. The CFO, heading the finance function of a company, is often a member of the Board of Directors and reports to the Chairman & Managing Director of the Company. Typically, the CFO supervises the work of the Treasurer and the Controller, who in turn look after various functional areas.

1.12 QUESTIONS AND EXERCISES

1. Define the scope of financial management. What role should the financial manager play in a modern enterprise?
2. How does the "modern" financial manager differ from the "traditional" financial manager? Does the "modern" financial manager's role differ for the large diversified firm and the small to medium size firm?
3. "... the function of financial management is to review and control decisions to commit or recommit funds to new or ongoing uses. Thus, in addition to raising funds, financial management is directly concerned with production, marketing, and other functions within an enterprise whenever decisions are made about the acquisition or destruction of assets" (Ezra Solomon). Elucidate.
4. What are the basic financial decisions? How do they involve risk-return trade-off?
5. "The profit maximisation is not an operationally feasible criterion". Do you agree? Illustrate your views.
6. In what ways is the wealth maximisation objective superior to the profit maximisation objective? Explain.
7. "The basic rationale for the objective of shareholders' wealth maximisation is that it reflects the most efficient use of society's economic resources and thus leads to a maximisation of society's economic wealth" (Ezra Solomon). Comment critically.
8. How should the finance function of an enterprise be organised? What functions do the financial officer perform?
9. Should the titles of controller and treasurer be adopted under Indian context? Would you like to modify their functions in view of the company practices in India? Justify your opinion.
10. When can there arise a conflict between shareholders' and managers' goals? How does wealth maximisation goal take care of this conflict?

UNIT 2 CAPITAL BUDGETING DECISIONS

NOTES

Structure

2.0 INTRODUCTION

An efficient allocation of capital is the most important finance function in the modern times. It involves decisions to commit the firm's funds to the long-term assets. Capital budgeting or investment decisions are of considerable importance to the firm since they tend to determine its

value by influencing its growth, profitability and risk. In this unit we focus on the nature and evaluation of capital budgeting decisions.

NOTES

2.1 UNIT OBJECTIVES

- Understand the nature and importance of investment decisions
- Understand the capital budgeting and investment proccess including planning and control
- Explain the methods of calculating net present value (NPV) and internal rate of return (IRR)
- Show the implications of net present value (NPV) and internal rate of return (IRR)
- Describe the non-DCF evaluation criteria: payback and accounting rate of return
- Illustrate the computation of the discounted payback
- Compare and contract NPV and IRR and emphasise the superiority of NPV rule
- Understand how to take investment decisions under capital rationing

2.2 NATURE OF INVESTMENT DECISIONS

The **investment decisions** of a firm are generally known as the capital budgeting, or capital expenditure decisions. A **capital budgeting decision** may be defined as the firm's decision to invest its current funds most efficiently in the long-term assets in anticipation of an expected flow of benefits over a series of years. The long-term assets are those that affect the firm's operations beyond the one-year period. The firm's investment decisions would generally include expansion, acquisition, modernisation and replacement of the long-term assets. Sale of a division or business (divestment) is also as an investment decision. Decisions like the change in the methods of sales distribution, or an advertisement campaign or a research and development programme have long-term implications for the firm's expenditures and benefits, and therefore, they should also be evaluated as investment decisions. It is important to note that investment in the long-term assets invariably requires large funds to be tied up in the current assets such as inventories and receivables. As such, investment in fixed and current assets is one single activity.

The following are the features of investment decisions:

- The exchange of current funds for future benefits.
- The funds are invested in long-term assets.
- The future benefits will occur to the firm over a series of years.

It is significant to emphasise that expenditures and benefits of an investment should be measured in cash. In the investment analysis, it is cash flow, which is important, not the accounting profit. It may also be pointed out that investment decisions affect the firm's value. The firm's value will increase if investments are profitable and add to the shareholders' wealth. Thus, investments should be evaluated on the basis of a criterion, which is compatible with the objective of the shareholders' wealth maximisation. An investment will add to the shareholders' wealth if it yields benefits in excess of the minimum benefits as per the **opportunity cost of capital**. In this unit, we assume that the investment project's opportunity cost of capital is known. We also assume that the expenditures and benefits of the investment are known with certainty. Both these assumptions are relaxed in later units.

2.2.1 Importance of Investment Decisions

Investment decisions require special attention because of the following reasons:[1]

- They influence the firm's growth in the long run
- They affect the risk of the firm
- They involve commitment of large amount of funds
- They are irreversible, or reversible at substantial loss
- They are among the most difficult decisions to make.

1. *See* Quirin, G.D., *The Capital Expenditure Decision*, Richard D. Irwin, 1977.

NOTES

Growth The effects of investment decisions extend into the future and have to be endured for a longer period than the consequences of the current operating expenditure. A firm's decision to invest in long-term assets has a decisive influence on the rate and direction of its growth. A wrong decision can prove disastrous for the continued survival of the firm; unwanted or unprofitable expansion of assets will result in heavy operating costs to the firm. On the other hand, inadequate investment in assets would make it difficult for the firm to compete successfully and maintain its market share.

Risk A long-term commitment of funds may also change the risk complexity of the firm. If the adoption of an investment increases average gain but causes frequent fluctuations in its earnings, the firm will become more risky. Thus, investment decisions shape the basic character of a firm.

Funding Investment decisions generally involve large amount of funds, which make it imperative for the firm to plan its investment programmes very carefully and make an advance arrangement for procuring finances internally or externally.

Irreversibility Most investment decisions are irreversible. It is difficult to find a market for such capital items once they have been acquired. The firm will incur heavy losses if such assets are scrapped.

Complexity Investment decisions are among the firm's most difficult decisions. They are an assessment of future events, which are difficult to predict. It is really a complex problem to correctly estimate the future cash flows of an investment. Economic, political, social and technological forces cause the uncertainty in cash flow estimation.

2.3 TYPES OF INVESTMENT DECISIONS

There are many ways to classify investments. One classification is as follows:

- Expansion of existing business
- Expansion of new business
- Replacement and modernisation.

2.3.1 Expansion and Diversification

A company may add capacity to its existing product lines to expand existing operations. For example, the Gujarat State Fertiliser Company (GSFC) may increase its plant capacity to manufacture more urea. It is an example of **related diversification**. A firm may expand its activities in a new business. Expansion of a new business requires investment in new products and a new kind of production activity within the firm. If a packaging manufacturing company invests in a new plant and machinery to produce ball bearings, which the firm has not manufactured before, this represents expansion of new business or **unrelated diversification**. Sometimes a company acquires existing firms to expand its business. In either case, the firm makes investment in the expectation of additional revenue. Investments in existing or new products may also be called as **revenue-expansion investments**.

2.3.2 Replacement and Modernisation

The main objective of modernisation and replacement is to improve operating efficiency and reduce costs. Cost savings will reflect in the increased profits, but the firm's revenue may remain unchanged. Assets become outdated and obsolete with technological changes. The firm must decide to replace those assets with new assets that operate more economically. If a cement company changes from semi-automatic drying equipment to fully automatic drying equipment, it is an example of modernisation and replacement. **Replacement decisions** help to introduce more efficient and economical assets and therefore, are also called **cost-reduction investments**. However, replacement decisions that involve substantial modernisation and technological improvements expand revenues as well as reduce costs.

Yet another useful way to classify investments is as follows:

- Mutually exclusive investments

Check Your Progress

1. How do we usually define capital budgeting decisions?
2. How do we usually define long term assets?
3. What type of decisions may be termed as a firm's long term investment decisions?
4. Why do investment decisions require special attention from a firm's management?

NOTES

- Independent investments
- Contingent investments.

2.3.3 Mutually Exclusive Investments

Mutually exclusive investments serve the same purpose and compete with each other. If one investment is undertaken, others will have to be excluded. A company may, for example, either use a more labour-intensive, semi-automatic machine, or employ a more capital-intensive, highly automatic machine for production. Choosing the semi-automatic machine precludes the acceptance of the highly automatic machine.

2.3.4 Independent Investments

Independent investments serve different purposes and do not compete with each other. For example, a heavy engineering company may be considering expansion of its plant capacity to manufacture additional excavators and addition of new production facilities to manufacture a new product—light commercial vehicles. Depending on their profitability and availability of funds, the company can undertake both investments.

2.3.5 Contingent Investments

Contingent investments are dependent projects; the choice of one investment necessitates undertaking one or more other investments. For example, if a company decides to build a factory in a remote, backward area, it may have to invest in houses, roads, hospitals, schools etc. for employees to attract the work force. Thus, building of factory also requires investment in facilities for employees. The total expenditure will be treated as one single investment.

2.4 CAPITAL BUDGETING PROCESS

Capital expenditure or investment planning and control involve a process of facilitating decisions covering expenditures on long-term assets. Since a company's survival and profitability hinges on capital expenditures, especially the major ones, the importance of the capital budgeting or investment process cannot be over-emphasised. A number of managers think that investment projects have strategic elements, and the investment analysis should be conducted within the overall framework of corporate strategy. Some managers feel that the qualitative aspects of investment projects should be given due importance.

2.4.1 Capital Investments

Strictly speaking, **capital investments** should include all those expenditures, which are expected to produce benefits to the firm over a long period of time, and encompass both tangible and intangible assets. Thus R&D (research and development) expenditure is a capital investment. Similarly, the expenditure incurred in acquiring a patent or brand is also a capital investment. In practice, a number of companies follow the traditional definition, covering only expenditures on tangible fixed assets as capital investments (expenditures). The Indian companies are also influenced considerably by accounting conventions and tax regulations in classifying capital expenditures. Large expenditures on R&D, advertisement, or employees training, which tend to create valuable intangible assets, may not be included in the definition of capital investments since most of them are allowed to be expensed for tax purposes in the year in which they are incurred. From the point of view of sound decision-making, these expenditures should be treated as capital investments and subjected to proper evaluation.

A number of companies follow the accounting convention to prepare asset wise classification of capital expenditures, which is hardly of much use in decision-making. Some companies classify capital expenditures in a manner, which could provide useful information for decision-making. Their classification is (*i*) replacement, (*ii*) modernisation, (*iii*) expansion, (*iv*) new project, (*v*) research and development, (*vi*) diversification, and (*vii*) cost reduction.

Check Your Progress

5. How do we classify different types of investment decisions?
6. Distinguish between expansion and diversification projects vis-à-vis replacement and modernization projects.

2.4.2 Capital Investment Planning And Control

NOTES

At least five phases of capital expenditure planning and control can be identified:

- Identification (or origination) of investment opportunities
- Development of forecasts of benefits and costs
- Evaluation of the net benefits
- Authorisation for progressing and spending capital expenditure
- Control of capital projects.

The available literature puts the maximum emphasises on the evaluation phase. Two reasons may be attributed to this bias. First, this phase is easily amenable to a structured, quantitative analysis. Second, it is considered to be the most important phase by academicians. Practitioners, on the other hand, consider other phases to be more important.[2] The capital investment planning and control phases are discussed below.

Investment Ideas: Who Generates? Investment opportunities have to be identified or created; they do not occur automatically.[3, 4] Investment proposals of various types may originate at different levels within a firm. Most proposals, in the nature of cost reduction or replacement or process or product improvements take place at plant level. The contribution of top management in generating investment ideas is generally confined to expansion or diversification projects. The proposals may originate systematically or haphazardly in a firm. The proposal for adding a new product may emanate from the marketing department or from the plant manager who thinks of a better way of utilising idle capacity. Suggestions for replacing an old machine or improving the production techniques may arise at the factory level. In view of the fact that enough investment proposals should be generated to employ the firm's funds fully well and efficiently, a systematic procedure for generating proposals may be evolved by a firm.

In a number of Indian companies, the investment ideas are generated at the plant level. The contribution of the board in idea generation is relatively insignificant. However, some companies depend on the board for certain investment ideas, particularly those that are strategic in nature. Other companies depend on research centres for investment ideas.

Is the investment idea generation primarily a bottom-up process in India? In UK, both bottom-up, as well as top-down processes exist.[5] The Indian practice is more like that in USA. Project initiation is a bottom-up process in USA, with about more than three-fourths of investment proposals coming from divisional management and plant personnel.[6] However, we should note that the small number of ideas generated at the top may represent a high percentage in terms of investment value, so that what looks to be an entirely bottom-up process may not be really so.

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

Once the investment proposals have been identified, they are be submitted for scrutiny. Many companies specify the time for submitting the proposals for scrutiny.

2. Hastie, K. L., One Businessman's View of Capital Budgeting, *Financial Management*, 3 (Writer 1974), pp. 36, 196.
3. Haynes, W.W. and Solomon, M.B., A Misplaced Emphasis in Capital Budgeting, *Quarterly Review of Economics and Business*, (Jan.-Feb. 1964), pp. 95–106.
4. King, P., Is the Emphasis of Capital Budgeting Theory Misplaced? *Journal of Business Finance and Accounting*, (Spring 1975), pp. 69–82.
5. Rockley, L.E., *Investment for Profitability*, Business Books, 1973.
6. Petty, J.W., and Scott, D.F., Capital Budgeting Practices in large US Firms: A Retrospective Analysis and Update, in Derkindem and Crum (Ed.), *Readings in Strategy for Corporate Investments*, Pitman, 1981.

NOTES

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

Executives in practice do not always have clarity about estimating cash flows. A large number of companies do not include additional working capital while estimating the investment project cash flows. A number of companies also mix up financial flows with operating flows. Although companies claim to estimate cash flows on incremental basis, some of them make no adjustment for sale proceeds of existing assets while computing the project's initial cost. The prevalence of such conceptual confusion has been observed even in the developed countries. For example, in the seventies, a number of UK companies were treating depreciation as cash flows.[7]

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

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

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

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

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

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

7. Rockley, *op. cit.*

NOTES

are very frequent in the company, and therefore, it is not necessary to use the DCF techniques for such projects. Both these companies have fallacious approaches towards investment analysis. They should subject all capital expenditures to formal evaluation.

The practice of companies in India regarding the use of evaluation criteria is similar to that in USA. Almost four-fifths of US firms use either the internal rate of return or net present value models, but only about one-fifth use such discounting techniques without using the payback period or average rate of return methods.[8] The tendency of US firms to use naive techniques as supplementary tools has also been reported in recent studies. However, firms in USA have come to depend increasingly on the DCF techniques, particularly IRR. The British companies use both DCF techniques and return on capital, sometimes in combination sometimes solely, in their investment evaluation; the use of payback is widespread.[9] In recent years the use of the DCF methods has increased in UK, and NPV is more popular than IRR.[10] However, this increase has not reduced the importance of the traditional methods such as payback and return on investment. Payback continues to be employed by almost all companies.

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

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

Not all companies in India specify the minimum acceptable rate of return. Some of them compute the weighted average cost of capital (WACC) as the discount rate. Unfortunately, all companies do not follow correct methodology of calculating the WACC. Almost all companies use the book value weights.

Business executives in India are becoming increasingly aware of the importance of the cost of capital, but they perhaps lack clarity about its computation. Arbitrary judgment of management also seems to play a role in the assessment of the cost of capital. The fallacious tendency of equating borrowing rate with minimum required rate of return also persists in the case of some companies.[11] In USA, a little more than 50 per cent companies have been found using WACC as cut-off rate.[12] In UK, only a very small percentage of firms were found attempting any calculation of the cost of capital.[13] As in USA and UK, companies in India have a tendency to equate the minimum rate with interest rate or cost of specific source of finance. The phenomenon of depending on management judgement for the assessment of the cost of capital is prevalent as much in USA and UK as in India.

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

Companies in India consider the following as the four most important contributors of investment risk: *selling price*, *product demand*, *technological changes* and *government policies*. India is fast changing from sellers' market to buyers' market as competition is intensifying in a large number of products; hence uncertainty of selling price and product demand are being realised as

8. Schall, L.D., Sundem, G.L. and Geijsbeak, W.R., Survey and Analysis of Capital Budgeting Methods, *Journal of Finance*, (March 1978), pp. 281–87.
9. Rockley, *op. cit.*
10. Pike, R.H., *Capital Budgeting Survey: An Update*, Bradford University Discussion Paper, 1992.
11. Pandey, I.M., Financing Decision: A Survey of Management Understanding, *Management Review*: *Economic & Political Weekly*, (Feb. 1984), pp. 27–31.
12. Petty and Scott, *op. cit.*
13. Rockley, *op. cit.*

NOTES

important risk factors. Uncertain government policies (in areas such as custom and excise duty and import policy, the foreign investment etc.), of course, are a continuous source of investment risk in developing countries like India.

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

In USA, risk adjusted discount rate is more popular than the use of payback and sensitivity analysis.[14, 15] The British companies hardly use sensitivity analysis.[16] The contrasts in risk evaluation practices in India, on the one hand, and USA and UK, on the other, are sharp and significant. Given the complex nature of risk factors in developing countries, risk evaluation cannot be handled through a single number such as the NPV calculation based on conservative forecasts or risk-adjusted discount rate. Managers must know the impact on project profitability of the full range of critical variables. An American businessman states: "there appear to be more corporations using sensitivity analysis than surveys indicate. In some cases firms may not know that what they are undertaking is called 'sensitivity analysis', and it probably is not in the sophisticated, computer oriented sense... Typically, analysts or middle managers eliminate the alternative assumptions and solutions in order to simplify the decision- making process for higher management."[17]

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

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

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

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

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

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

14. Schall et al., *op. cit.*
15. Petty and Scott, *op. cit.*
16. Rockley, *op. cit.*
17. Hastie, *op. cit.*

years. Some companies feel that long-range plans have a significant influence on the evaluation and funding of capital expenditure proposals.

Control and Monitoring A **capital investment reporting system** is required to review and monitor the performance of investment projects after completion and during their life. The follow-up comparison of the actual performance with original estimates not only ensures better forecasting but also helps to sharpen the techniques for improving future forecasts. Based on the follow-up feedback, the company may reappraise its projects and take remedial action.

Indian companies practice control of capital expenditure through the use of regular project reports. Some companies require quarterly reporting, others need monthly, half-yearly and yet a few companies require continuous reporting. In most of the companies, the evaluation reports include information on expenditure to date, stage of physical completion, and approved and revised total cost.

Most of the companies in reappraising investment proposals, consider comparison between actual and forecast capital cost, saving and rate of return. They perceive the following advantages of reappraisal: (*i*) improvement in profitability by positioning the project as per the original plan; (*ii*) ascertainment of errors in investment planning which can be avoided in future; (*iii*) guidance for future evaluation of projects; and (*iv*) generation of cost consciousness among the project team. A few companies abandon the project if it becomes uneconomical. The power of review is generally invested with the top executives of the companies in India.

NOTES

2.5 TIME VALUE OF MONEY

The DCF criteria of investment evaluation are based on the concept of time value of money. The time value of money has its logic in the fact that investors have ample investment opportunities available to them, and therefore, one rupee received today is not same in value as one rupee received after a period of time since one rupee received today can be invested at a rate of interest. The rate of interest depends on the risk of investment. Higher the risk, higher the rate of interest expected. If there is no risk, the rate of interest (called risk-free rate) will be low, say, 5–10 per cent.

There are basically two ways for accounting for the time value of money:

- Compounding
- Discounting

2.5.1 Compounding

Suppose that an investor can invest Rs 100 today in a bank at an interest of 12 per cent for one year. How much amount would he receive after a year? He will receive his principal as well as interest on the principal. That is; 100 + 12% × 100 = 100 × 112% = 100 × 1.12 = Rs 112. Notice that Rs 112 is the compound or future value (*F*) of the present amount (*P*) of Rs 100 at an interest rate of (*i*) of 12 per cent for a period (*n*) of one year. Thus

$$F = P + iP = P\ (1 + i) = 100\ (1.12) = \text{Rs } 112.$$

If the investment is made for two years, the investor will receive interest on the interest amount earned during the first year:

$$F = P\ (1 + i)\ (1 + i) = \text{P}\ (1 + i)^2 = 100\ (1.12)^2 = 100\ (1.2544) = \text{Rs } 125.44$$

Similarly the present amount of Rs 100 invested at 12 per cent for 3 years will grow to: $F = 100\ (1.12)\ (1.12)\ (1.12) = 100\ (1.12)^3 = 100\ (1.4049) = \text{Rs } 140.49$; for 4 years: $100\ (1.12)\ (1.12)\ (1.12)\ (1.12) = 100\ (1.12)^4 = 100\ (1.5735) = \text{Rs } 157.35$ and so on.

Compound Value of a Lump Sum From the preceding discussion, we can write the formula for calculating the future value (*F*) of a lump sum today (*P*) at a given rate of interest (*i*) for given period of time (*n*) as follows:

$$F = P\ (1 + i)^n \qquad (1)$$

Check Your Progress

7. What type of expenditures should be included in capital investments?
8. List the major phases of capital expenditure planning and control.
9. What are the main methods of evaluating capital investment projects?

NOTES

The term $(1 + i)^n$ is the compound (future) value factor, of Re 1 for a given rate of interest, i and time period, n, i.e. CVF, i, n. It always has a value greater than 1 for positive i, indicating that CVF increases with increase in either i or n or both.

In the earlier example, the values 1.12, 1.2544, 1.4049 and 1.5735 are CVF of Re 1 at 12 per cent rate of interest respectively for year 1, 2, 3 and 4. Using Eq. (1) CVFs can be calculated for any combination of interest rate and time period. Table A in Appendix at the end of the book provides precalculated CVFs for a range of periods and rates of interest.

Illustration 2.1

Jacob is considering investing of Rs 15,000 in a public sector company's bonds at a rate of interest of 16 per cent per year for 7 years. How much amount would he get after 7 years? The compound value can be found as follows:

$$F = 15{,}000\ (1.16)^7 = 15{,}000 \times \text{CVF, } .16, 7$$

The term $(1.16)^7$ gives CVF, which can be obtained from Table A in the Appendix. Reading through seventh row for 7 year period and 16 per cent column, we get CVF of 2.826. Thus the compound half-yearly, for finding out the compound value of the lump sum of Rs 15,000 invested today at 16 per cent per annum for 7 years is:

$$F = 15{,}000 \times 2.826 = \text{Rs } 42{,}390$$

Multiperiod Compounding Let us assume in Illustration 2.1 that the company will compound interest half-yearly (semi-annually) instead of annually. Investor will gain as he will get interest on half-yearly interest. Since interest will be compounded half-yearly, for finding out the compound value in Illustration 2.1, the half-yearly interest rate of 8 per cent and 14 half yearly periods will be considered:

$$F = P\left(1+\frac{i}{2}\right)^{n\times 2} \tag{2}$$

$$= 15{,}000\left(1+\frac{.16}{2}\right)^{7\times 2} = 15{,}000\ (1.08)^{14}$$

From Table A in the Appendix, we find that CVF at 8 per cent interest for 14 periods is 2.937. Thus, the compound value of Rs 15,000 is:

$$F = 15{,}000 \times 2.937 = \text{Rs } 44{,}055$$

Would the compound value of Jacob's investment of Rs 15,000 be different if the company compounds interest quarterly? The quarterly rate of interest will be 4 per cent and number of quarterly periods will be 28. Thus

$$F = P\left(1+\frac{i}{4}\right)^{n\times 4} = 15{,}000\left(1+\frac{.16}{4}\right)^{7\times 4}$$

$$= 15{,}000\ (1.04)^{28} = 15{,}000\ (2.999) = \text{Rs } 44.995$$

We can observe that the compound value increases further under quarterly compounding.

The phenomenon of compounding interest more than once in a year is called *multiperiod compounding*. The compound value increases as the frequency of compounding in a year increases. Eq. (1) can be modified as follows to find compound value under multiperiod compound:

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

where m is the number of compounding in a year.

Compound Value of an Annuity An annuity is a fixed payment or receipt of each period for a specified number of periods. Let us assume that an investor decides to deposit Rs 100 at the end of each for 4 years at 10 per cent rate of interest. Thus Rs 100 deposited at the end of first year will compound for 3 years, Rs 100 at the end of second year for 2 years, Rs 100 at the end of third year for one year and Rs 100 at the end of fourth year would remain constant. Thus the compound value will be as given below:

End of year	$1F = 100\ (1.10)^3 =$	$100\ (1.331) = 331.1$
	$2F = 100\ (1.10)^2 =$	$100\ (1.210) = 121.0$
	$3F = 100\ (1.10)^1 =$	$100\ (1.100) = 110.0$
	$4F = 100\ (1.10)^0 =$	$100\ (1.000) = 100.0$
Total compound value		$100\ (4.641) = 464.1$

As can be observed from the table, we can obtain the compound value of an annuity (A) by aggregating CVFs for the given periods and then multiplying by the amount of annuity. For example:

$$F = A\ (1+i)^3 + A\ (1+i)^2 + A\ (1+i) + A = A\ [(1+i)^3 + (1+i)^2 + (1+i) + 1]$$
$$= 100\ [(1.10)^3 + (1.10)^2 + (1.10)^1 + 1] = 100\ [1.331 + 1.210 + 1.100 + 1]$$
$$= 100\ (4.641) = \text{Rs}\,464.1$$

The factor 4.641 is the compound value factor of an annuity of Re 1 for 4 years at 10 per cent rate of interest. A short-cut formula for calculating the compound value of an annuity is as follows:

$$F = A\left[\frac{(1+i)^n - 1}{i}\right] \tag{3}$$

The expression $[(1 + i)^n - 1]\ i$ gives the compound value factor for an annuity of Re 1 for a given rate of interest, i and time period, n, i.e., CVAF, i, n. Table B in the Appendix at the end of the book provides precalculated compound value factor for an annuity, CVFA, of Re 1 for a range of interest rates and periods of time.

Illustration 2.2

A person deposits Rs 10,000 at the end of each year for 5 years at 12 per cent rate of interest. How much would the annuity accumulate to at the end of the fifth year?

Looking up the fifth row and 12 per cent column in Table B, we obtain CVAF of 6.353. Thus

$$F = A\ (\text{CVAF, } 12\%, 5) = 10{,}000 \times 6.353 = \text{Rs } 63{,}530$$

If the interest is compounded quarterly, how much will be the compound value? For quarterly compounding, interest rate of 3 per cent and time period of 20 periods will be considered. Returning to Table B we find that:

$$F = 2{,}500 \times 26.870 = \text{Rs } 67{,}175$$

Sinking Fund Suppose you want to accumulate Rs 4,00,000 at the end of 10 years to pay for the acquisition of a flat. If the interest rate is 12 per cent, how much amount should you invest each year so that it grows to Rs 4,00,000 at the end of 10 years? This is a sinking fund problem. A fund which is created out of fixed payments each year for a specified period of time is called *sinking fund*.

The desired sum of Rs 4,00,000 is the compound value of an annuity, say, A, at 12 per cent rate of interest for 10 years. Thus

$$F = A\ (\text{CVAF, } 12\%, 10)$$
$$4{,}00{,}000 = A\ (17.549)$$
$$A = 4{,}00{,}000\ (1/17.549)$$
$$= 4{,}00{,}000\ (0.57) = \text{Rs } 22{,}800$$

It may be noticed that the future sum, Rs 4,00,000, is multiplied by the reciprocal of the compound value annuity factor (CVAF, .057 = (1/17.549), to obtain the amount of annuity.

The reciprocal of CVAF is called the *sinking fund factor* (SFF).

2.5.2 Discounting

Suppose a bank offers to an investor to return a sum of Rs 115 in exchange for Rs 100 to be deposited by the investor today. Should he accept the offer? His decision will depend on the rate of interest which he can earn on his Rs 100 from an alternative investment of similar risk.

NOTES

Suppose the investor's rate of interest is 11 per cent. The alternative investment opportunity will provide the investor Rs 100 (1.11) = Rs 111 after a year. Since the bank is offering more than this amount, the investor should accept the offer. Let us ask a different question. Between what amount today (P) and Rs 115 after a year (F), will the investor be indifferent? He will be indifferent to that amount of which Rs 115 is exactly equal to 111 per cent or 1.11 times. Thus

$$F = P(1+i)$$

$$P = \frac{F}{(1+i)}$$

$$115 = P(1.11)$$

$$P = \frac{115}{1.11} = \text{Rs } 103.60$$

Note that Rs 103.60 invested today at 11 per cent grows to Rs 115 after a year. Rs 103.60 is the present or discounted value of Rs 115. That is:

$$F = P(1+i)^2$$

$$115 = P(1.11)^2$$

therefore,

$$P = \frac{F}{(1+i)^2}$$

$$P = \frac{115}{(1.11)^2} = 115 \times 0.912$$

The formula for calculating the present value (P) of a lump sum in future (F) at a given rate of interest (i) for given periods of time is as follows:

$$F = P(1+i)^n$$

$$P = F\left[\frac{1}{(1+i)^n}\right] \tag{4}$$

The term $1/(1+i)^n$ provides the present value factor of Re 1 for a given rate of interest, i and time period, n, i.e. PVF, i, n, (it may be written as PVF, i, n). It always has a value lesser than 1 for positive i, indicating that PVF decreases with increase in either i or n or both. Table C in the Appendix at the end of the book provides precalculated PVFs.

Present Value of an Annuity Suppose Narsimham pays Rs 10,000 at the end of each year for 5 years into a public provident fund. The interest rate being 12 per cent per year. What is the present value of the series of Rs 10,000 paid each year for 5 years? We can treat each payment as a lump sum and calculate the present value as follows:

$$\text{End of year } 1P = 10,000\left[\frac{1}{(1.12)^1}\right] = 10,000 \times 0.893 = \text{Rs } 8,930$$

$$2P = 10,000\left[\frac{1}{(1.12)^2}\right] = 10,000 \times 0.797 = \text{Rs } 6,360$$

$$3P = 10,000\left[\frac{1}{(1.12)^3}\right] = 10,000 \times 0.712 = \text{Rs } 7,120$$

$$4P = 10,000\left[\frac{1}{(1.12)^4}\right] = 10,000 \times 0.636 = \text{Rs } 6,360$$

$$5P = 10,000\left[\frac{1}{(1.12)^5}\right] = 10,000 \times 0.576 = \text{Rs } 5,760$$

10,000	×	3.614 = Rs 36,140

Aggregating PVFs (of a lump sum of Re 1) for the given periods and then multiplying by the amount of annuity. Thus

$$P = \frac{A}{(1+i)} + \frac{A}{(1+i)^2} + \frac{A}{(1+i)^3} + \frac{A}{(1+i)^4} + \frac{A}{(1+i)^5}$$

$$= A\left[\frac{1}{(1+i)} + \frac{1}{(1+i)^2} + \frac{1}{(1+i)^3} + \frac{1}{(1+i)^4} + \frac{1}{(1+i)^5}\right]$$

$$= 10,000\left[\frac{1}{(1.12)} + \frac{1}{(1.12)^2} + \frac{1}{(1.12)^3} + \frac{1}{(1.12)^4} + \frac{1}{(1.12)^5}\right]$$

$$= 10,000\,[0.893 + 0.797 + 0.712 + 0.636 + 0.576]$$

$$= 10,000 \times 3.614 = \text{Rs } 36,140$$

The factor 3.614 is the present value factor of an annuity of Re 1 for 5 years at 12 per cent rate of interest. A short-cut formula for calculating the present value of an annuity is as follows:

$$P = A\left[\frac{1 - \frac{1}{(1+i)^n}}{i}\right] \tag{5}$$

Table D in the Appendix at the end of the book provides precalculated present value factor for an annuity of Re 1 for a given rate of interest, *i* and time period, *n*, i.e. PVFA *i*, *n*, for a range of interest rates and periods of time.

Illustration 2.3

Anant Rao is considering of paying Rs 5,000 half-yearly into his public provident fund for 10 years. Suppose the interest rate is 12 per cent per annum. How much is the present value of his payment? Since the annuity is in terms of half-yearly payments, the number of periods to be considered is 20 and half-yearly interest to be 6 per cent. Referring to Table D of Appendix, the present value may be calculated as follows:

$$P = 5,000 \times \text{PVAF, } 6\%, 20 = 5,000 \times 11.470 = \text{Rs } 57,350$$

Capital Recovery The reciprocal of the present value annuity factor is called the capital recovery factor (CRF). It is useful in determining the income to be earned to recover an investment at a given rate of interest.

Suppose Priyan is considering investing Rs 20,000 today for a period of 3 years. If he expects a return of 16 per cent per year, how much annual income should he earn? The amount of Rs 20,000 is the present value of a 3-year annuity, *A*, given the rate of interest of 15 per cent. Thus

$$P = A(\text{PVAF}, 16\%, 3)$$

$$20,000 = A(2.246)$$

$$A = 20,000\left[\frac{1}{2.246}\right] = 20,000 \times 0.445 = \text{Rs } 8,900$$

It may be observed that the present sum, Rs 20,000, is multiplied by the reciprocal of the present value annuity factor, PVAF, 0.445 = (1/2.246) to obtain the amount of annuity.

2.6 INVESTMENT EVALUATION CRITERIA

Three steps are involved in the evaluation of an investment:

- Estimation of cash flows
- Estimation of the required rate of return (the opportunity cost of capital)
- Application of a decision rule for making the choice.

NOTES

The first two steps, discussed in the subsequent units, are assumed as given. Thus, our discussion in this unit is confined to the third step. Specifically, we focus on the merits and demerits of various decision rules.

2.6.1 Investment Decision Rule

The investment decision rules may be referred to as capital budgeting techniques, or investment criteria. A sound appraisal technique should be used to measure the economic worth of an investment project. The essential property of a sound technique is that it should maximise the shareholders' wealth. The following other characteristics should also be possessed by a sound investment evaluation criterion:[18]

- It should consider all cash flows to determine the true profitability of the project.
- It should provide for an objective and unambiguous way of separating good projects from bad projects.
- It should help ranking of projects according to their true profitability.
- It should recognise the fact that bigger cash flows are preferable to smaller ones and early cash flows are preferable to later ones.
- It should help to choose among mutually exclusive projects that project which maximises the shareholders' wealth.
- It should be a criterion which is applicable to any conceivable investment project independent of others.

These conditions will be clarified as we discuss the features of various investment criteria in the following pages.

2.6.2 Evaluation Criteria

A number of investment criteria (or capital budgeting techniques) are in use in practice. They may be grouped in the following two categories:

1. ***Discounted Cash Flow (DCF) Criteria***
   - Net present value (NPV)
   - Internal rate of return (IRR)
   - Profitability index (PI)
2. ***Non-discounted Cash Flow Criteria***
   - Payback period (PB)
   - Discounted payback period
   - Accounting rate of return (ARR).

Discounted payback is a variation of the payback method. It involves discounted cash flows, but, as we shall see later, it is not a true measure of investment profitability. We will show in the following pages that the net present value criterion is the most valid technique of evaluating an investment project. It is consistent with the objective of maximising the shareholders' wealth.

2.7 NET PRESENT VALUE METHOD

Check Your Progress

10. Which are the two main categories in which we divide the evaluation criteria of capital budgeting decisions?

The net present value (NPV) method is the classic economic method of evaluating the investment proposals. It is a DCF technique that explicitly recognises the time value of money. It correctly postulates that cash flows arising at different time periods differ in value and are comparable only when their equivalents—present values—are found out. The following steps are involved in the calculation of NPV:

18. See Porterfield, J.T.S., *Investment Decisions and Capital Costs*, Prentice-Hall, 1965.

- Cash flows of the investment project should be forecasted based on realistic assumptions.
- Appropriate discount rate should be identified to discount the forecasted cash flows. The appropriate discount rate is the project's opportunity cost of capital, which is equal to the required rate of return expected by investors on investments of equivalent risk.
- Present value of cash flows should be calculated using the opportunity cost of capital as the discount rate.
- Net present value should be found out by subtracting present value of cash outflows from present value of cash inflows. The project should be accepted if NPV is positive (i.e., NPV > 0).

Let us consider an example.

Illustration 2.4: Calculating Net Present Value

Assume that Project *X* costs Rs 2,500 now and is expected to generate year-end cash inflows of Rs 900, Rs 800, Rs 700, Rs 600 and Rs 500 in years 1 through 5. The opportunity cost of the capital may be assumed to be 10 per cent.

The net present value for Project *X* can be calculated by referring to the present value table (Table C at the end of the book). The calculations are shown below:

$$\text{NPV} = \left[\frac{\text{Rs } 900}{(1+0.10)} + \frac{\text{Rs } 800}{(1+0.10)^2} + \frac{\text{Rs } 700}{(1+0.10)^3} + \frac{\text{Rs } 600}{(1+0.10)^4} + \frac{\text{Rs } 500}{(1+0.10)^5}\right] - \text{Rs } 2{,}500$$

$$\text{NPV} = [\text{Rs } 900(\text{PVF}_{1,\,0.10}) + \text{Rs } 800(\text{PVF}_{2,\,0.10}) + \text{Rs } 700(\text{PVF}_{3,\,0.10}) + \text{Rs } 600(\text{PVF}_{4,\,0.10}) + \text{Rs } 500(\text{PVF}_{5,\,0.10})] - \text{Rs } 2{,}500$$

$$\text{NPV} = [\text{Rs } 900 \times 0.909 + \text{Rs } 800 \times 0.826 + \text{Rs } 700 \times 0.751 + \text{Rs } 600 \times 0.683 + \text{Rs } 500 \times 0.620] - \text{Rs } 2{,}500$$

$$\text{NPV} = \text{Rs } 2{,}725 - \text{Rs } 2{,}500 = + \text{Rs } 225$$

Project *X*'s present value of cash inflows (Rs 2,725) is greater than that of cash outflow (Rs 2,500). Thus, it generates a positive net present value (NPV = + Rs 225). Project *X* adds to the wealth of owners; therefore, it shoul d be accepted.

The formula for the net present value can be written as follows:

$$\text{NPV} = \left[\frac{C_1}{(1+k)} + \frac{C_2}{(1+k)^2} + \frac{C_3}{(1+k)^3} + \cdots + \frac{C_n}{(1+k)^n}\right] - C_0$$

$$\text{NPV} = \sum_{t=1}^{n} \frac{C_t}{(1+k)^t} - C_0 \qquad (6)$$

where C_1, C_2... represent net cash inflows in year 1, 2..., k is the opportunity cost of capital, C_0 is the initial cost of the investment and n is the expected life of the investment. It should be noted that the cost of capital, k, is assumed to be known and is constant.

2.7.1 Why is NPV Important?

A question may be raised: why should a financial manager invest Rs 2,500 in Project *X*? Project *X* should be undertaken if it is best for the company's shareholders; they would like their shares to be as valuable as possible. Let us assume that the total market value of a hypothetical company is Rs 10,000, which includes Rs 2,500 cash that can be invested in Project *X*. Thus the value of the company's other assets must be Rs 7,500. The company has to decide whether it should spend cash and accept Project *X* or to keep the cash and reject Project *X*. Clearly Project *X* is desirable since its *PV* (Rs 2,725) is greater than the Rs 2,500 cash. If Project *X* is accepted, the total market value of the firm will be: Rs 7,500 + *PV* of Project *X* = Rs 7,500 + Rs 2,725 = Rs 10,225; that is, an increase by Rs 225. The company's total market value would remain only Rs 10,000 if Project *X* were rejected.

Why should the *PV* of Project *X* reflect in the company's market value? To answer this question, let us assume that a new company *X* with Project *X* as the only asset is formed. What is the value of the company? We know from our earlier discussion on valuation of shares in Unit 3 that the market value of a company's shares is equal to the present value of the expected dividends. Since Project *X* is the only asset of Company *X*, the expected dividends would be equal to the forecasted cash flows from Project *X*. Investors would discount the forecasted dividends at a rate of return

NOTES

Excel Application 2.1: Calculation of NPV

We can easily calculate NPV using the Excel financial function for NPV. The spreadsheet on the right side gives the cash flows of the project. We write the NPV formula in column C8: =NPV(0.10,C3:C7)+C2. You may note that 0.10 (10 per cent) is the discount rate. The project cash flows from year 1 through 5 are contained in column C3 through column C7. The initial cash flow (that is, cash flow in year 0) is added.

	A	B	C	D	E
1	Year	Cash flow		PVF at 10%	PV
2	0	C_0	–2500	1.000	–2500
3	1	C_1	900	0.909	818
4	2	C_2	800	0.826	661
5	3	C_3	700	0.751	526
6	4	C_4	600	0.683	410
7	5	C_5	500	0.621	310
8		NPV	226	SUM(E2:E7) →	226
9	NPV(0.1,C3:C7)+C2				
10					

expected on securities equivalent in risk to company *X*. The rate used by investors to discount dividends is exactly the rate, which we should use to discount cash flows of Project *X*. The calculation of the PV of Project *X* is a replication of the process, which shareholders will be following in valuing the shares of company *X*. Once we find out the value of Project *X*, as a separate venture, we can add it to the value of other assets to find out the portfolio value.

The difficult part in the calculation of the PV of an investment project is the precise measurement of the discount rate. Funds available with a company can either be invested in projects or given to shareholders. Shareholders can invest funds distributed to them in financial assets. Therefore, the discount rate is the opportunity cost of investing in projects rather than in capital markets. Obviously, the opportunity cost concept makes sense when financial assets are of equivalent risk as compared to the project.

Table 2.1: Interpretation of NPV

	Amount outstanding in the beginning	*Return on outstanding amount at 10%*	*Total outstanding flows*	*Repayment from cash at the end*	*Balance outstanding*
Year	***Rs***	***Rs***	***Rs***	***Rs***	***Rs***
1	2,725.00	272.50	2,997.50	900	2,097.50
2	2,097.50	209.75	2,307.25	800	1,507.25
3	1,507.25	150.73	1,657.98	700	957.98
4	957.98	95.80	1,053.78	600	453.78
5	453.78	45.38	499.16	500	(0.84)*

* Rounding off error.

An alternate interpretation of the positive net present value of an investment is that it represents the maximum amount a firm would be ready to pay for purchasing the opportunity of making investment, or the amount at which the firm would be willing to sell the right to invest without being financially worse-off. The net present value (Rs 225) can also be interpreted to represent the amount the firm could raise at the required rate of return (10%), in addition to the initial cash

outlay (Rs 2,500), to distribute immediately to its shareholders and by the end of the projects' life to have paid off all the capital raised and return on it.[19] The point is illustrated by the calculations shown in Table 2.1.

Calculations in Table 2.1 are based on the assumption that the firm chooses to receive the cash benefit resulting from the investment in the year it is made. Any pattern of cash receipts, such that the net present value is equal to Rs 225, can be selected. Thus, if the firm raises Rs 2,500 (the initial outlay) instead of Rs 2,725 (initial outlay *plus* net present value) at 10 per cent rate of return, at the end of fifth year after having paid the principal sum together with interest, it would be left with Rs 363, whose present value at the beginning of the first year at 10 per cent discount rate is Rs 225. It should be noted that the gain to shareholders would be more if the rate of raising money is less than 10 per cent. (Why?)

2.7.2 Acceptance Rule

It should be clear that the acceptance rule using the NPV method is to accept the investment project if its net present value is positive (NPV > 0) and to reject it if the net present value is negative (NPV < 0). Positive NPV contributes to the net wealth of the shareholders, which should result in the increased price of a firm's share. The positive net present value will result only if the project generates cash inflows at a rate higher than the opportunity cost of capital. A project with zero NPV (NPV = 0) may be accepted. A zero NPV implies that project generates cash flows at a rate just equal to the opportunity cost of capital. The NPV acceptance rules are:

- Accept the project when NPV is positive NPV > 0
- Reject the project when NPV is negative NPV < 0
- May accept the project when NPV is zero NPV = 0

The NPV method can be used to select between mutually exclusive projects; the one with the higher NPV should be selected. Using the NPV method, projects would be ranked in order of net present values; that is, first rank will be given to the project with highest positive net present value and so on.

2.7.3 Evaluation of the NPV Method

NPV is the true measure of an investment's profitability. It provides the most acceptable investment rule for the following reasons:

- ***Time value*** It recognises the time value of money—a rupee received today is worth more than a rupee received tomorrow.
- ***Measure of true profitability*** It uses *all* cash flows occurring over the entire life of the project in calculating its worth. Hence, it is a measure of the project's true profitability. The NPV method relies on estimated cash flows and the discount rate rather than any arbitrary assumptions, or subjective considerations.
- ***Value-additivity*** The discounting process facilitates measuring cash flows in terms of present values; that is, in terms of equivalent, current rupees. Therefore, the NPVs of projects can be added. For example, NPV (*A* + *B*) = NPV (*A*) + NPV (*B*). This is called the **value-additivity principle.** It implies that if we know the NPVs of individual projects, the value of the firm will increase by the *sum* of their NPVs. We can also say that if we know values of individual assets, the firm's value can simply be found by adding their values. The value-additivity is an important property of an investment criterion because it means that each project can be evaluated, independent of others, on its own merit.
- ***Shareholder value*** The NPV method is always consistent with the objective of the shareholder value maximisation. This is the greatest virtue of the method.

Are there any limitations in using the NPV rule? The NPV method is a theoretically sound method. In practice, it may pose some computational problems.

19. Bierman, H. and Smidt, S., *The Capital Budgeting Decision*, Macmillan, 1975, p. 73.

NOTES

- ***Cash flow estimation*** The NPV method is easy to use *if* forecasted cash flows are known. In practice, it is quite difficult to obtain the estimates of cash flows due to uncertainty.
- ***Discount rate*** It is also difficult in practice to precisely measure the discount rate.
- ***Mutually exclusive projects*** Further, caution needs to be applied in using the NPV method when alternative (mutually exclusive) projects with unequal lives, or under funds constraint are evaluated. The NPV rule may not give unambiguous results in these situations.
- ***Ranking of projects*** It should be noted that the ranking of investment projects as per the NPV rule is *not* independent of the discount rates.[20] Let us consider an example.

Suppose two projects—*A* and *B*—both costing Rs 50 each. Project *A* returns Rs 100 after one year and Rs 25 after two years. On the other hand, Project *B* returns Rs 30 after one year and Rs 100 after two years. At discount rates of 5 per cent and 10 per cent, the NPV of projects and their ranking are as follows:

	NPV at 5%	*Rank*	*NPV at 10%*	*Rank*
Project *A*	67.92	II	61.57	I
Project *B*	69.27	I	59.91	II

It can be seen that the project ranking is reversed when the discount rate is changed from 5 per cent to 10 per cent. The reason lies in the cash flow patterns. The impact of the discounting becomes more severe for the cash flow occurring later in the life of the project; the higher is the discount rate, the higher would be the discounting impact. In the case of Project *B*, the larger cash flows come later in the life. Their present value will decline as the discount rate increases.

2.8 INTERNAL RATE OF RETURN METHOD

The internal rate of return (IRR) method is another discounted cash flow technique, which takes account of the magnitude and timing of cash flows.[21] Other terms used to describe the IRR method are yield on an investment, marginal efficiency of capital, rate of return over cost, time-adjusted rate of internal return and so on. The concept of internal rate of return is quite simple to understand in the case of a one-period project. Assume that you deposit Rs 10,000 with a bank and would get back Rs 10,800 after one year. The true rate of return on your investment would be:

$$\text{Rate of return} = \frac{10{,}800 - 10{,}000}{10{,}000} = \frac{10{,}800}{10{,}000} - 10{,}000 = 1.08 - 1 = 0.08 \text{ or, } 8\%$$

The amount that you would obtain in the future (Rs 10,800) would consist of your investment (Rs 10,000) plus return on your investment ($0.08 \times$ Rs 10,000):

$$10{,}000\,(1.08) = 10{,}800$$

$$10{,}000 = \frac{10{,}800}{(1.08)}$$

You may observe that the rate of return of your investment (8 per cent) makes the discounted (present) value of your cash inflow (Rs 10,800) equal to your investment (Rs 10,000).

We can now develop a formula for the rate of return (r) on an investment (C_0) that generates a single cash flow after one period (C_1) as follows:

$$r = \frac{C_1 - C_0}{C_0} = \frac{C_1}{C_0} - 1 \qquad (7)$$

Equation (7) can be rewritten as follows:

Check Your Progress

11. Describe the basic approach of calculating the net present value of an investment proposal.
12. Why is NPV method considered perhaps the best method for evaluating the profitability of a project? Are there any difficulties associated with this method?

20. Bierman and Smidt, *op. cit*., p. 31.
21. The use of IRR for appraising capital investment was emphasised in the formal terms, for the first time, by Joel Dean. See, Dean, Joel, *Capital Budgeting*, Columbia University Press, 1951, and his article, Measuring the Productivity of Capital in Solomon, E. (Ed.), *The Management of Corporate Capital*.

$$\frac{C_1}{C_0} = 1 + r$$

$$C_0 = \frac{C_1}{(1+r)} \quad (8)$$

NOTES

From Equation (8), you may notice that the rate of return, *r*, depends on the project's cash flows, rather than any outside factor. Therefore, it is referred to as the internal rate of return. The **internal rate of return** (IRR) is the rate that equates the investment outlay with the present value of cash inflow received after one period. This also implies that the rate of return is the discount rate which makes NPV = 0. There is no satisfactory way of defining the true rate of return of a long-term asset. IRR is the best available concept. We shall see that although it is a very frequently used concept in finance, yet at times it can be a misleading measure of investment worth.[22] IRR can be determined by solving the following equation for *r*:

$$C_0 = \frac{C_1}{(1+r)} + \frac{C_2}{(1+r)^2} + \frac{C_3}{(1+r)^3} + \cdots + \frac{C_n}{(1+r)^n}$$

$$C_0 = \sum_{t=1}^{n} \frac{C_t}{(1+r)^t}$$

$$\sum_{t=1}^{n} \frac{C_t}{(1+r)^t} - C_0 = 0 \quad (9)$$

It can be noticed that the IRR equation is the same as the one used for the NPV method. In the NPV method, the required rate of return, *k*, is known and the net present value is found, while in the IRR method the value of *r* has to be determined at which the net present value becomes zero.

2.8.1 Uneven Cash Flows: Calculating IRR by Trial and Error

The value of *r* in Equation (9) can be found out by trial and error. The approach is to select any discount rate to compute the present value of cash inflows. If the calculated present value of the expected cash inflow is lower than the present value of cash outflows, a lower rate should be tried. On the other hand, a higher value should be tried if the present value of inflows is higher than the present value of outflows. This process will be repeated unless the net present value becomes zero. The following illustration explains the procedure of calculating IRR.

Illustration 2.5: Trial and Error Method for Calculating IRR

A project costs Rs 16,000 and is expected to generate cash inflows of Rs 8,000, Rs 7,000 and Rs 6,000 at the end of each year for next 3 years. We know that IRR is the rate at which project will have a zero NPV. As a first step, we try (arbitrarily) a 20 per cent discount rate. The project's NPV at 20 per cent is:

$$\begin{aligned} \text{NPV} &= -\text{Rs } 16{,}000 + \text{Rs } 8{,}000(\text{PVF}_{1,\,0.20}) + \text{Rs } 7{,}000(\text{PVF}_{2,\,0.20}) + \text{Rs } 6{,}000(\text{PVF}_{3,\,0.20}) \\ &= -\text{Rs } 16{,}000 + \text{Rs } 8{,}000 \times 0.833 + \text{Rs } 7{,}000 \times 0.694 + \text{Rs } 6{,}000 \times 0.579 \\ &= -\text{Rs } 16{,}000 + \text{Rs } 14{,}996 = -\text{Rs } 1{,}004 \end{aligned}$$

A negative NPV of Rs 1,004 at 20 per cent indicates that the project's true rate of return is lower than 20 per cent. Let us try 16 per cent as the discount rate. At 16 per cent, the project's NPV is:

$$\begin{aligned} \text{NPV} &= -\text{Rs } 16{,}000 + \text{Rs } 8{,}000(\text{PVF}_{1,\,0.16}) + \text{Rs } 7{,}000(\text{PVF}_{2,\,0.16}) + \text{Rs } 6{,}000(\text{PVF}_{3,\,0.16}) \\ &= -\text{Rs } 16{,}000 + \text{Rs } 8{,}000 \times 0.862 + \text{Rs } 7{,}000 \times 0.743 + \text{Rs } 6{,}000 \times 0.641 \\ &= -\text{Rs } 16{,}000 + \text{Rs } 15{,}943 = -\text{Rs } 57 \end{aligned}$$

Since the project's NPV is still negative at 16 per cent, a rate lower than 16 per cent should be tried. When we select 15 per cent as the trial rate, we find that the project's NPV is Rs 200:

$$\begin{aligned} \text{NPV} &= -\text{Rs } 16{,}000 + \text{Rs } 8{,}000(\text{PVF}_{1,\,0.15}) + \text{Rs } 7{,}000(\text{PVF}_{2,\,0.15}) + \text{Rs } 6{,}000(\text{PVF}_{3,\,0.15}) \\ &= -\text{Rs } 16{,}000 + \text{Rs } 8{,}000 \times 0.870 + \text{Rs } 7{,}000 \times 0.756 + \text{Rs } 6{,}000 \times 0.658 \\ &= -\text{Rs } 16{,}000 + \text{Rs } 16{,}200 = \text{Rs } 200 \end{aligned}$$

22. Brealey, R. and Myers, S., *Principles of Corporate Finance*, McGraw Hill, 1991, p. 8.

NOTES

The true rate of return should lie between 15–16 per cent. We can find out a close approximation of the rate of return by the method of linear interpolation as follows:

		Difference
PV required	Rs 16,000	
		200
PV at lower rate, 15%	16,200	
		257
PV at higher rate, 16%	15,943	

r = 15% + (16% – 15%)200/257
= 15% + 0.80% = 15.8%

2.8.2 Level Cash Flows

An easy procedure can be followed to calculate the IRR for a project that produces level or equal cash flows each period. To illustrate, let us assume that an investment would cost Rs 20,000 and provide annual cash inflow of Rs 5,430 for 6 years. If the opportunity cost of capital is 10 per cent, what is the investment's NPV? The Rs 5,430 is an annuity for 6 years. The NPV can be found as follows:

$$NPV = -\text{Rs } 20{,}000 + \text{Rs } 5{,}430(PVFA_{6,0.10}) = -\text{Rs } 20{,}000 + \text{Rs } 5{,}430 \times 4.355 = \text{Rs } 3{,}648$$

How much is the project's IRR? The IRR of the investment can be found out as follows:

$$NPV = -\text{Rs } 20{,}000 + \text{Rs } 5{,}430(PVFA_{6,r}) = 0$$
$$\text{Rs } 20{,}000 = \text{Rs } 5{,}430(PVFA_{6,r})$$
$$PVFA_{6,r} = \frac{\text{Rs } 20{,}000}{\text{Rs } 5{,}430} = 3.683$$

The rate, which gives a PVFA of 3.683 for 6 years, is the project's internal rate of return. Looking up PVFA in Table (given at the end of the book) across the 6-year row, we find it approximately under the 16 per cent column. Thus, 16 per cent is the project's IRR that equates the present value of the initial cash outlay (Rs 20,000) with the constant annual cash inflows (Rs 5,430 per year) for 6 years.

2.8.3 NPV Profile and IRR

We repeat to emphasise that NPV of a project declines as the discount rate increases, and for discount rates higher than the project's IRR, NPV will be negative. NPV profile of the project at various discount rates is shown in Table 2.2 and Figure 2.1. At 16 per cent, the NPV is zero; therefore, it is the IRR of the project. As you may notice, we have used the Excel spreadsheet to make the computations and create the chart using the Excel chart wizard.

Table 2.2: NPV Profile

1	NPV Profile		
2	Cash Flow	Discount rate	NPV
3	– 20000	0%	12,580
4	5430	5%	7,561
5	5430	10%	3,649
6	5430	15%	550
7	5430	16%	0
8	5430	20%	(1,942)
9	5430	25%	(3,974)

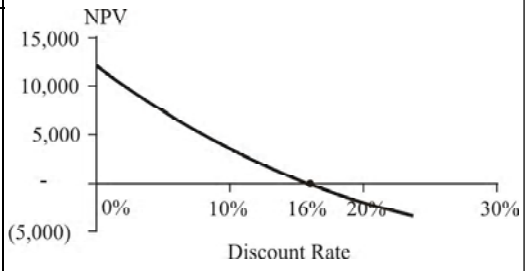


Figure 2.1: NPV profile

NOTES

2.8.4 Acceptance Rule

The accept-or-reject rule, using the IRR method, is to accept the project if its internal rate of return is higher than the opportunity cost of capital ($r > k$). Note that k is also known as the required rate of return, or the cut-off, or hurdle rate. The project shall be rejected if its internal rate of return is lower than the opportunity cost of capital ($r < k$). The decision maker may remain indifferent if the internal rate of return is equal to the opportunity cost of capital. Thus the IRR acceptance rules are:

- Accept the project when $r > k$
- Reject the project when $r < k$
- May accept the project when $r = k$

The reasoning for the acceptance rule becomes clear if we plot NPVs and discount rates for the project given in Table 2.2 on a graph like Figure 2.1. It can be seen that if the discount rate is less than 16 per cent IRR, then the project has *positive* NPV; if it is equal to IRR, the project has a *zero* NPV; and if it is greater than IRR, the project has negative NPV. Thus, when we compare IRR of the project with the opportunity cost of capital, we are in fact trying to ascertain whether the project's NPV is positive or not. In case of independent projects, IRR and NPV rules will give the same results if the firm has no shortage of funds.

Excel Application 2.2:
Calculation of IRR

We can easily calculate IRR using the Excel function for IRR. The spreadsheet below gives the cash flows of the project. We write the IRR formula in column C7: =IRR(C3:C6). The project cash flows, including the cash outlay in the beginning (C_0 in year 0) are contained in column C3 through column C6. It is optional to include the "guess" rate in the formula.

	A	B	C	D
1	**IRR of An Investment Project**			
2	Year	Cash Flow (Rs)		
3	0	C_0	–16000	
4	1	C_1	8000	
5	2	C_2	7000	
6	3	C_3	6000	
7		IRR	15.8%	IRR(C3:C6)

2.8.5 Evaluation of IRR Method

IRR method is like the NPV method. It is a popular investment criterion since it measures profitability as a percentage and can be easily compared with the opportunity cost of capital. IRR method has following merits:

- ***Time value*** The IRR method recognises the time value of money.
- ***Profitability measure*** It considers *all* cash flows occurring over the entire life of the project to calculate its rate of return.
- ***Acceptance rule*** It generally gives the same acceptance rule as the NPV method.
- ***Shareholder value*** It is consistent with the shareholders' wealth maximisation objective. Whenever a project's IRR is greater than the opportunity cost of capital, the shareholders' wealth will be enhanced.

Like the NPV method, the IRR method is also theoretically a sound investment evaluation criterion. However, IRR rule can give misleading and inconsistent results under certain circumstances. Here we briefly mention the problems that IRR method may suffer from.

NOTES

- ***Multiple rates*** A project may have multiple rates, or it may not have a unique rate of return. As we explain later on, these problems arise because of the mathematics of IRR computation.
- ***Mutually exclusive projects*** It may also fail to indicate a correct choice between mutually exclusive projects under certain situations. This pitfall of the IRR method is elaborated later on in this unit.
- ***Value additivity*** Unlike in the case of the NPV method, the value additivity principle does not hold when the IRR method is used—IRRs of projects do not add.[23] Thus, for Projects *A* and *B*, IRR(*A*) + IRR(*B*) need not be equal to IRR (*A* + *B*). Consider an example given below.

The NPV and IRR of Projects *A* and *B* are given below:

Project	C_0 *(Rs)*	C_1 *(Rs)*	*NPV @ 10% (Rs)*	*IRR (%)*
A	– 100	+ 120	+ 9.1	20.0
B	– 150	+ 168	+ 2.7	12.0
A + *B*	– 250	+ 288	+ 11.8	15.2

It can be seen from the example that NPVs of projects add:

$$\text{NPV}(A) + \text{NPV}(B) = \text{NPV}(A + B) = 9.1 + 2.7 = 11.8, \text{ while}$$
$$\text{IRR}(A) + \text{IRR}(B) \neq \text{IRR}(A + B) = 20\% + 12\% \neq 15.2\%$$

2.9 PROFITABILITY INDEX

Yet another time-adjusted method of evaluating the investment proposals is the benefit-cost (B/C) ratio or profitability index (PI). **Profitability index** is the ratio of the present value of cash inflows, at the required rate of return, to the initial cash outflow of the investment. The formula for calculating **benefit-cost ratio** or profitability index is as follows:

$$\text{PI} = \frac{\text{PV of cash inflows}}{\text{Initial cash outlay}} = \frac{\text{PV}(C_t)}{C_0} = \sum_{t=1}^{n} \frac{C_t}{(1+k)^t} \div C_0 \qquad (10)$$

Illustration 2.6: PI of Uneven Cash Flows

The initial cash outlay of a project is Rs 100,000 and it can generate cash inflow of Rs 40,000, Rs 30,000, Rs 50,000 and Rs 20,000 in year 1 through 4. Assume a 10 per cent rate of discount. The PV of cash inflows at 10 per cent discount rate is:

$$\text{PV} = \text{Rs } 40{,}000(\text{PVF}_{1, 0.10}) + \text{Rs } 30{,}000(\text{PVF}_{2, 0.10}) + \text{Rs } 50{,}000(\text{PVF}_{3, 0.10}) + \text{Rs } 20{,}000(\text{PVF}_{4, 0.10})$$
$$= \text{Rs } 40{,}000 \times 0.909 + \text{Rs } 30{,}000 \times 0.826 + \text{Rs } 50{,}000 \times 0.751 + \text{Rs } 20{,}000 \times 0.68$$
$$\text{NPV} = \text{Rs } 112{,}350 - \text{Rs } 100{,}000 = \text{Rs } 12{,}350$$
$$\text{PI} = \frac{\text{Rs } 112{,}350}{\text{Rs } 100{,}000} = 1.1235.$$

2.9.1 Acceptance Rule

The following are the PI acceptance rules:

- Accept the project when PI is greater than one PI > 1
- Reject the project when PI is less than one PI < 1
- May accept the project when PI is equal to one PI = 1

The project with positive NPV will have PI greater than one. PI less than means that the project's NPV is negative.

2.9.2 Evaluation of PI Method

Like the NPV and IRR rules, PI is a conceptually sound method of appraising investment projects. It is a variation of the NPV method, and requires the same computations as the NPV method.

Check Your Progress

13. Define the basic method of calculating the internal rate of return (IRR) while appraising an investment project.
14. In the IRR system, how do we decide which projects to accept or reject?
15. What is the main difference in the concepts of NPV and IRR?

23. Copeland, T.E. and Weston, J.F., *Financial Theory and Corporate Policy*, Addison-Wesley, 1983, p. 32.

NOTES

- ***Time value*** It recognises the time value of money.
- ***Value maximisation*** It is consistent with the shareholder value maximisation principle. A project with PI greater than one will have positive NPV and if accepted, it will increase shareholders' wealth.
- ***Relative profitability*** In the PI method, since the present value of cash inflows is divided by the initial cash outflow, it is a relative measure of a project's profitability.

Like NPV method, PI criterion also requires calculation of cash flows and estimate of the discount rate. In practice, estimation of cash flows and discount rate pose problems.

2.10 PAYBACK

The payback (PB) is one of the most popular and widely recognised traditional methods of evaluating investment proposals. **Payback** is the number of years required to recover the original cash outlay invested in a project. If the project generates constant annual cash inflows, the payback period can be computed by dividing cash outlay by the annual cash inflow. That is:

$$\text{Payback} = \frac{\text{Initial Investment}}{\text{Annual Cash Inflow}} = \frac{C_0}{C} \tag{11}$$

Illustration 2.7: Payback (Constant Cash Flows)

Assume that a project requires an outlay of Rs 50,000 and yields annual cash inflow of Rs 12,500 for 7 years. The payback period for the project is:

$$\text{PB} = \frac{\text{Rs}\,50{,}000}{\text{Rs}\,12{,}000} = 4 \text{ years}$$

Unequal cash flows In case of unequal cash inflows, the payback period can be found out by adding up the cash inflows until the total is equal to the initial cash outlay. Consider the following example.

Illustration 2.8: Payback (Uneven Cash Flows)

Suppose that a project requires a cash outlay of Rs 20,000, and generates cash inflows of Rs 8,000; Rs 7,000; Rs 4,000; and Rs 3,000 during the next 4 years. What is the project's payback? When we add up the cash inflows, we find that in the first three years Rs 19,000 of the original outlay is recovered. In the fourth year cash inflow generated is Rs 3,000 and only Rs 1,000 of the original outlay remains to be recovered. Assuming that the cash inflows occur evenly during the year, the time required to recover Rs 1,000 will be (Rs 1,000/Rs 3,000) × 12 months = 4 months. Thus, the payback period is 3 years and 4 months.

2.10.1 Acceptance Rule

Many firms use the payback period as an investment evaluation criterion and a method of ranking projects. They compare the project's payback with a predetermined, standard payback. The project would be accepted if its payback period is less than the maximum or **standard payback** period set by management. As a ranking method, it gives highest ranking to the project, which has the shortest payback period and lowest ranking to the project with highest payback period. Thus, if the firm has to choose between two mutually exclusive projects, the project with shorter payback period will be selected.

2.10.2 Evaluation of Payback

Payback is a popular investment criterion in practice. It is considered to have certain virtues.

- ***Simplicity*** The most significant merit of payback is that it is simple to understand and easy to calculate. The business executives consider the simplicity of method as a virtue. This is evident from their heavy reliance on it for appraising investment proposals in practice.

Check Your Progress

16. What is the advantage of the Profitability Index Method over the NPV method?

NOTES

- ***Cost effective*** Payback method costs less than most of the sophisticated techniques that require a lot of the analysts' time and the use of computers.
- ***Short-term effects*** A company can have more favourable short-run effects on earnings per share by setting up a shorter standard payback period.[24] It should, however, be remembered that this may not be a wise long-term policy as the company may have to sacrifice its future growth for current earnings.
- ***Risk shield*** The risk of the project can be tackled by having a shorter standard payback period as it may ensure guarantee against loss. A company has to invest in many projects where the cash inflows and life expectancies are highly uncertain. Under such circumstances, payback may become important, not so much as a measure of profitability but as a means of establishing an upper bound on the acceptable degree of risk.[25]
- ***Liquidity*** The emphasis in payback is on the early recovery of the investment. Thus, it gives an insight into the liquidity of the project. The funds so released can be put to other uses.

In spite of its simplicity and the so-called virtues, the payback may not be a desirable investment criterion since it suffers from a number of serious limitations:

- ***Cash flows after payback*** Payback fails to take account of the cash inflows earned after the payback period. For example, consider the following projects *X* and *Y*:

	Cash Flows (Rs)					
Project	C_0	C_1	C_2	C_3	**Payback**	**NPV**
X	– 4,000	0	4,000	2,000	2 years	+ 806
Y	– 4,000	2,000	2.000	0	3 years	– 530

As per the payback rule, both the projects are equally desirable since both return the investment outlay in two years. If we assume an opportunity cost of 10 per cent, Project *X* yields a positive net present value of Rs 806 and Project *Y* yields a negative net present value of Rs 530. As per the NPV rule, Project *X* should be accepted and Project *Y* rejected. Payback rule gave wrong results because it failed to consider Rs 2,000 cash flow in third year for Project *X*.

- ***Cash flows ignored*** Payback is not an appropriate method of measuring the profitability of an investment project as it does not consider all cash inflows yielded by the project. Considering Project *X* again, payback rule did not take into account its entire series of cash flows.
- ***Cash flow patterns*** Payback fails to consider the pattern of cash inflows, i.e., magnitude and timing of cash inflows. In other words, it gives equal weights to returns of equal amounts even though they occur in different time periods. For example, compare the following projects *C* and *D* where they involve equal cash outlay and yield equal total cash inflows over equal time periods:

	Cash Flows (Rs)					
Project	C_0	C_1	C_2	C_3	**Payback**	**NPV**
C	– 5,000	3,000	2,000	2,000	2 years	+ 881
D	– 5,000	2,000	3,000	2,000	2 years	+ 798

Using payback period, both projects are equally desirable. But Project *C should be* preferable as larger cash inflows' come earlier in its life. This is indicated by the NPV rule; project *C* has higher NPV (Rs 881) than Project *D* (Rs 798) at 10 per cent opportunity cost. It should be thus clear that payback is not a measure of profitability. As such, it is dangerous to use it as a decision criterion.

- ***Administrative difficulties*** A firm may face difficulties in determining the maximum acceptable payback period. There is no rational basis for setting a maximum payback period. It is generally a subjective decision.

24. Weston, J.F. and Brighane, E.F., *Managerial Finance*, Holt, Rinehart & Winston, 1972, p. 145.
25. Quirin, *op. cit.*, pp. 31–32.

NOTES

EXHIBIT 2.1: CAPITAL BUDGETING METHODS IN PRACTICE

- In a study of the capital budgeting practices of fourteen medium to large size companies in India, it was found that all companies, except one, used payback. With payback and/or other techniques, about two-thirds of companies used IRR and about two-fifths NPV. IRR was found to be the second most popular method.
- The reasons for the popularity of payback in order of significance were stated to be its *simplicity to use and understand, its emphasis on the early recovery of investment* and *focus on risk.*
- It was also found that one-third of companies always insisted on the computation of payback for all projects, one-third for majority of projects and remaining for some of the projects. For about two-thirds of companies standard payback ranged between 3 and 5 years.
- Reasons for the secondary role of DCF techniques in India included *difficulty in understanding and using these techniques, lack of qualified professionals* and *unwillingness of top management* to use DCF techniques. One large manufacturing and marketing organisation mentioned that conditions of its business were such that DCF techniques were not needed. Yet another company stated that replacement projects were very frequent in the company, and it was not considered necessary to use DCF techniques for evaluating such projects.

Source: Pandey, I.M., Capital Budgeting Practices of Indian Companies, *MDI Management Journal*, Vol. 2, No. 1 (Jan. 1989).

- ***Inconsistent with shareholder value*** Payback is not consistent with the objective of maximising the market value of the firm's shares. Share values do not depend on payback periods of investment projects.[26]

Let us re-emphasise that the payback is not a valid method for evaluating the acceptability of the investment projects. It can, however, be used along with the NPV rule as a first step in roughly screening the projects. In practice, the use of DCF techniques has been increasing but payback continues to remain a popular and primary method of investment evaluation (Exhibit 2.1).

2.10.3 Payback Reciprocal and the Rate of Return

Payback is considered theoretically useful in a few situations. One significant argument in favour of payback is that its reciprocal is a good approximation of the rate of return under certain conditions.[27]

The payback period is defined as follows:

$$\text{Payback} = \frac{\text{Initial investment}}{\text{Annual cash inflow (annuity)}} = \frac{C_0}{C} \tag{12}$$

The formula for the present value of an annuity is given by the following equation as discussed in Unit 2. (*i* in the original equation is being replaced by *r*, the internal rate of return).

$$C_0 = C\left[\frac{1-\frac{1}{(1+r)^n}}{r}\right] = \frac{C}{r} - \frac{C}{r}\left[\frac{1}{(1+r)^n}\right]$$

Multiplying both sides by *r*, we get

$$rC_0 = C - C\left[\frac{1}{(1+r)^n}\right]$$

Check Your Progress

17. Why is the Payback method popular?
18. What are the perceived disadvantages of the Payback method?

26. Porterfield, *op. cit.*, p. 22.
27. Gordon, Myron, Payoff Period and Rate of Profit, *Journal of Business*, XXVIII, No. 4, pp. 253–60.

NOTES

Solving for r, we find

$$r = \frac{C}{C_0} - \frac{C}{C_0}\left[\frac{1}{(1+r)^n}\right] \quad (13)$$

where C_0 is the initial investment, C is annual cash inflow, r is rate of return and n is the life of investment.

In Equation (13), the first right-hand term is the reciprocal of the payback period. The second right-hand term is payback reciprocal multiplied by $1/(1 + r)^n$. If n is very large or extends to infinity, the second term becomes insignificant (almost equal to zero), and we are left with the term C/C_0. Thus, IRR is equal to the reciprocal of payback.[28]

The reciprocal of payback will be a close approximation of the internal rate of return if the following two conditions are satisfied:

- The life of the project is large or at least twice the payback period.
- The project generates equal annual cash inflows.

The payback reciprocal is a useful technique to quickly estimate the true rate of return. But its major limitation is that every investment project does not satisfy the conditions on which this method is based. When the useful life of the project is not at least twice the payback period, the payback reciprocal will always exceed the rate of return. Similarly, it cannot be used as an approximation of the rate of return if the project yields uneven cash inflows.

2.11 DISCOUNTED PAYBACK PERIOD

One of the serious objections to the payback method is that it does not discount the cash flows for calculating the payback period. We can discount cash flows and then calculate the payback. The **discounted payback period** is the number of periods taken in recovering the investment outlay on the present value basis. The discounted payback period still fails to consider the cash flows occurring after the payback period.

Let us consider an example. Projects *P* and *Q* involve the same outlay of Rs 4,000 each. The opportunity cost of capital may be assumed as 10 per cent. The cash flows of the projects and their discounted payback periods are shown in Table 2.3.

Table 2.3: Discounted Payback Illustrated

	Cash Flows (Rs)							
	C_0	C_1	C_2	C_3	C_4	*Simple PB*	*Discounted PB*	*NPV at 10%*
P	– 4,000	3,000	1,000	1,000	1,000	2 yrs	—	—
PV of cash flows	– 4,000	2,727	826	751	683		2.6 YRS	987
Q	– 4,000	0	4,000	1,000	2,000	2 YRS	—	—
PV of cash flows	– 4,000	0	3,304	751	1,366		2.9 YRS	1,421

The projects are indicated of same desirability by the simple payback period. When cash flows are discounted to calculate the discounted payback period, Project *P* recovers the investment outlay faster than Project *Q*, and therefore, it would be preferred over Project *Q*. Discounted payback period for a project will be always higher than simple payback period because its calculation is based on the discounted cash flows. Discounted payback rule is better as it discounts the cash flows until the outlay is recovered. But it does not help much. It does not take into consideration the entire series of cash flows. It can be seen in our example that if we use the NPV rule, Project *Q* (with higher discounted payback period) is better.

Check Your Progress

19. Compare the Payback Period method with the Discounted Payback Period method.

28. In fact, the optimal cut-off for the payback can be computed from the present value of an annuity formula:

$$\text{Optimal cutoff} = \frac{C_0}{C} = \left[\frac{1}{r} - \frac{1}{r(1+r)^n}\right].$$

NOTES

2.12 ACCOUNTING RATE OF RETURN METHOD

The **accounting rate of return** (ARR), also known as the ***return on investment*** (ROI), uses accounting information, as revealed by financial statements, to measure the profitability of an investment. The accounting rate of return is the ratio of the average after tax profit divided by the average investment. The average investment would be equal to half of the original investment if it were depreciated constantly. Alternatively, it can be found out by dividing the total of the investment's book values after depreciation by the life of the project. The accounting rate of return, thus, is an average rate and can be determined by the following equation:

$$\text{ARR} = \frac{\text{Average income}}{\text{Average investment}} \tag{14}$$

In Equation (14) average income should be defined in terms of earnings after taxes without an adjustment for interest viz. EBIT $(1 - T)$ or net operating profit after tax. Thus

$$\text{ARR} = \frac{\left[\sum_{t=1}^{n} \text{EBIT}_t (1-T)\right] / n}{(I_0 + I_n)/2} \tag{15}$$

where EBIT is earnings before interest and taxes, T tax rate, I_0 book value of investment in the beginning, I_n book value of investment at the end of n number of years.[29]

Illustration 2.9: Accounting Rate of Return

A project will cost Rs 40,000. Its stream of earnings before depreciation, interest and taxes (EBDIT) during first year through five years is expected to be Rs 10,000, Rs 12,000, Rs 14,000, Rs 16,000 and Rs 20,000. Assume a 50 per cent tax rate and depreciation on straight-line basis. Project's ARR is computed in Table 2.4.

$$\text{Accounting Rate of Return} = \frac{3{,}200}{20{,}000} \times 100 = 16 \text{ per cent}$$

A variation of the ARR method is to divide average earnings after taxes by the original cost of the project instead of the average cost. Thus, using this version, the ARR in Illustration 2.6 would be: Rs 3,200 ÷ Rs 40,000 × 100 = 8 per cent. This version of the ARR method is less consistent as earnings are averaged but investment is not.[30]

Table 2.4: Calculation of Accounting Rate of Return

(Rs)

Period	***1***	***2***	***3***	***4***	***5***	***Average***
Earnings before depreciation, interest and taxes (EBDIT)	10,000	12,000	14,000	16,000	20,000	14,400
Depreciation	8,000	8,000	8,000	8,000	8,000	8,000
Earnings before interest and taxes (EBIT)	2,000	4,000	6,000	8,000	12,000	6,400
Taxes at 50%	1,000	2,000	3,000	4,000	6,000	3,200
Earnings before interest and after taxes [EBIT (1– *T*)]	1,000	2,000	3,000	4,000	6,000	3,200
Book value of investment:						
Beginning	40,000	32,000	24,000	16,000	8,000	
Ending	32,000	24,000	16,000	8,000	—	
Average	36,000	28,000	20,000	12,000	4,000	20,000

29. We assume straight-line depreciation.
30. Quirin, *op. cit.*, p. 33.

NOTES

2.12.1 Acceptance Rule

As an accept-or-reject criterion, this method will accept all those projects whose ARR is higher than the minimum rate established by the management and reject those projects which have ARR less than the minimum rate. This method would rank a project as number one if it has highest ARR and lowest rank would be assigned to the project with lowest ARR.

2.12.2 Evaluation of ARR Method

The ARR method may claim some merits:

- ***Simplicity*** The ARR method is simple to understand and use. It does not involve complicated computations.
- ***Accounting data*** The ARR can be readily calculated from the accounting data; unlike in the NPV and IRR methods, no adjustments are required to arrive at cash flows of the project.
- ***Accounting profitability*** The ARR rule incorporates the entire stream of income in calculating the project's profitability.

The ARR is a method commonly understood by accountants, and frequently used as a performance measure. As a decision criterion, however, it has serious shortcomings.

- ***Cash flows ignored*** The ARR method uses accounting profits, not cash flows, in appraising the projects. Accounting profits are based on arbitrary assumptions and choices and also include non-cash items. It is, therefore, inappropriate to rely on them for measuring the acceptability of the investment projects.
- ***Time value ignored*** The averaging of income ignores the time value of money. In fact, this procedure gives more weightage to the distant receipts.
- ***Arbitrary cut-off*** The firm employing the ARR rule uses an arbitrary cut-off yardstick. Generally, the yardstick is the firm's current return on its assets (book-value). Because of this, the growth companies earning very high rates on their existing assets may reject profitable projects (i.e., with positive NPVs) and the less profitable companies may accept bad projects (i.e., with negative NPVs).

The ARR method continues to be used as a performance evaluation and control measure in practice. But its use as an investment criterion is certainly undesirable. It may lead to unprofitable allocation of capital.

2.13 NPV VERSUS IRR

The net present value and the internal rate of return methods are two closely related investment criteria. Both are time-adjusted methods of measuring investment worth. In case of independent projects, two methods lead to same decisions. However, under certain situations (to be discussed later in this section), a conflict arises between them. It is under these cases that a choice between the two criteria has to be made.

2.13.1 Equivalence of NPV and IRR: Case of Conventional Independent Projects

It is important to distinguish between conventional and non-conventional investments in discussing the comparison between NPV and IRR methods. A **conventional investment** can be defined as one whose cash flows take the pattern of an initial cash outlay followed by cash inflows. Conventional projects have only one *change in the sign* of cash flows; for example, the initial outflow followed by inflows, i.e., – + + +. A **non-conventional investment**, on the other hand, is one, which has cash outflows mingled with cash inflows throughout the life of the project.[31] Non-conventional investments have more than one change in the signs of cash flows; for example, – + + + – ++ – +.

Check Your Progress

20. What are the main advantages of the ARR method?
21. What are the major shortcomings of the ARR system?

31. Bierman and Smidt, *op. cit.*, pp. 7–8.

NOTES

In case of conventional investments, which are economically *independent* of each other, NPV and IRR methods result in same accept-or-reject decision *if* the firm is not constrained for funds in accepting *all* profitable projects. Same projects would be indicated profitable by both methods. The logic is simple to understand. As has been explained earlier, all projects with positive net present values would be accepted if the NPV method is used, or projects with internal rates of return higher than the required rate of return would be accepted if the IRR method were followed. The last or **marginal project** acceptable under the NPV method is the one, which has zero net present value; while using the IRR method, this project will have an internal rate of return equal to the required rate of return. Projects with positive net present values would also have internal rates of return higher than the required rate of return and the marginal project will have zero present value only when its internal rate of return is equal to the required rate of return.

We know that NPV is:

$$\text{NPV} = \sum_{t=1}^{n} \frac{C_t}{(1+k)^t} - C_0 \tag{16}$$

and IRR is that rate r which satisfies the following equation:

$$\text{NPV} = \sum_{t=1}^{n} \frac{C_t}{(1+r)^t} - C_0 = 0 \tag{17}$$

Subtracting Equation (17) from Equation (16), we get

$$\text{NPV} = \sum_{t=1}^{n} \left[\frac{C_t}{(1+k)^t} - \frac{C_t}{(1+r)^t} \right] \tag{18}$$

As we know that C_t, k, r and t are positive, NPV can be positive (NPV > 0) only if $r > k$. NPV would be zero if and only if $r = k$ and it would be negative (NPV < 0) if $r < k$. Thus, we find that NPV and IRR methods are equivalent as regards the acceptance or rejection of independent conventional investments.

Figure 2.2 also substantiates this argument where oa_2 represents the highest net present value for the project at zero discount rate; at this point NPV is simply the difference between cash inflows and cash outflows. At r_2, discount rate, the net present value is zero and therefore, by definition, r_2 is the internal rate of return of the project. For discount rate (say r_3) greater than IRR, the net present value would be negative. Conversely, for discount rate (say r_1) lower than IRR, the net present value of the project will be positive. Thus, if the required rate of return is r_1, the project will be accepted under both methods since the net present value, oa_1, is greater than zero and internal rate, r_2, exceeds the required rate, r_1. Project could also be accepted if the required rate is r_2 as net present value is zero and the required rate and internal rate are equal. But the project would be rejected under either method if the required rate is r_3 as the net present value is negative and the internal rate of return is lower than the required rate of return (i.e., $r_2 < r_3$).

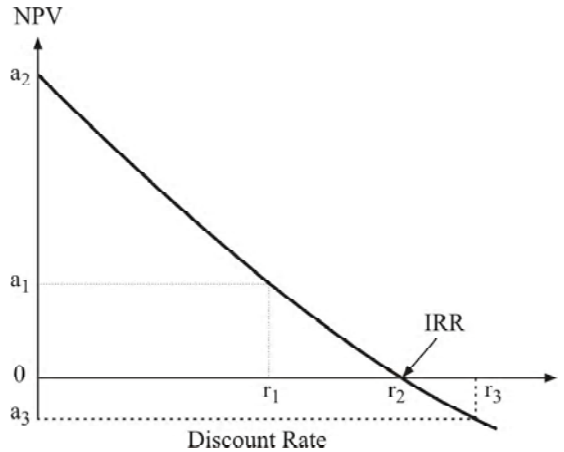


Figure 2.2: Equivalency of NPV and IRR

NOTES

2.13.2 Lending and Borrowing-type Projects

Figure 2.3 shows that the NPV of a project declines as the discount rate increases. This may not be true in the case of all projects. Investment projects may have the characteristics of lending or borrowing or both.[32] Consider the following situations:

	Cash Flows (Rs)			
Project	C_0	C_1	***IRR***	***NPV at 10%***
X	– 100	120	20%	9
Y	100	– 120	20%	– 9

Figure 2.3 is drawn to show the NPV profiles of projects *X* and *Y*. It can be seen in Figure 2.3(a) that for Project *X*, the NPV declines as the discount rate increases. The NPV is zero at 20 per cent of return; it is positive for rates lower than 20 per cent rate and negative for rates higher than 20 per cent. Project *X*, a **lending-type project**, is a typical example of a conventional investment in which a series of cash outlays is followed by a series of cash inflows. Interpreted differently, it can be stated that in the case of Project *X* we are *lending* Rs 100 at a rate of return of 20 per cent. If our opportunity cost of capital is 10 per cent, we shall lend (or invest) Rs 100. The higher the rate we *earn*, the happier we are.

For Project *Y*, on the other hand, we find that the NPV increases with increase in the discount rate [Figure 2.3(b)]. Like in the case of Project *X*, the NPV is zero at 20 per cent discount rate. However, it is negative at rates lower than 20 per cent and positive at rates higher than 20 per cent. Project

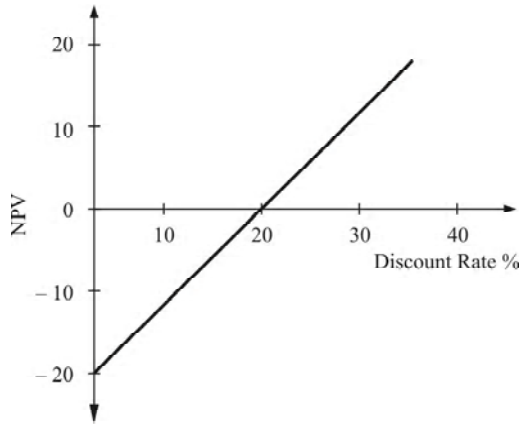


Figure 2.3 (b): Project *Y*

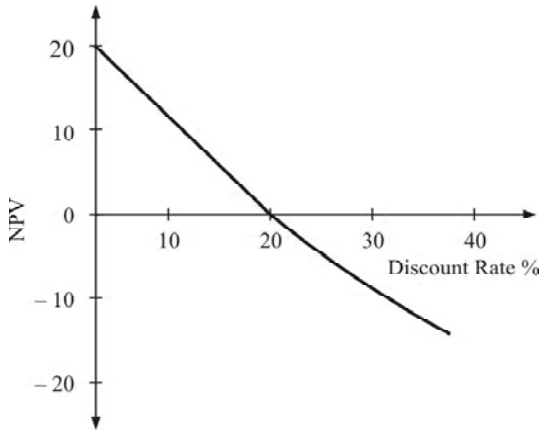


Figure 2.3 (a): Project *X*

32. See Bierman and Smidt, *op. cit*., pp. 218–51, and Brealey and Myers, *op. cit*., pp. 82–83.

Y is a **borrowing-type project**. In the case of Project *Y*, we are *borrowing* Rs 100 at a rate of return of 20 per cent. The 20 per cent is a return to the lender; to us it is a cost. We shall be well-off only if we could borrow at a rate less than our opportunity cost of capital (*viz.* 10 per cent in the example). Thus, for us, the borrower, the NPV is negative for rates of discount less than 20 per cent and positive for higher rates of discount. In a borrowing-type project, the lower the rate we *pay*, the happier we are.

2.13.3 Non-conventional Investments: Problem of Multiple IRRs

A serious shortcoming of the IRR method, when used to evaluate non-conventional investments, is that it can yield multiple internal rates of return.[33] The reason for more than one rate of return solution lies in the *algebra* of the IRR equation. As we know, the formula to calculate IRR is as follows:

$$\text{NPV} = \left[\frac{C_1}{(1+r)} + \frac{C_2}{(1+r)^2} + \cdots + \frac{C_n}{(1+r)^n}\right] - C_0 = 0$$
$$\text{NPV} = \sum_{t=1}^{n} \frac{C_t}{(1+r)^t} - C_0 = 0 \qquad (19)$$

In solving for *r* as the unknown, the analyst is actually solving for *n* roots of *r*. In case of conventional investment only one positive value for *r* exists, other roots being either imaginary or negative. It is in the case of non-conventional project, which involves more than one reversal of signs in cash flows that there is the possibility of multiple positive roots of *r*. To illustrate the problem of multiple rates, consider the following example.

Illustration 2.10: Dual Rates of Return

Let us consider the following project I:

	Cash Flows (Rs)		
Project	C_0	C_1	C_2
I	– 1,000	4,000	– 3,750

We can use the IRR formula to solve the internal rate of return of this project:

$$\frac{4{,}000}{(1+r)} - \frac{3{,}750}{(1+r)^2} - 1{,}000 = 0$$

$$\text{Assuming } \frac{1}{1+r} = x, \text{ we obtain } \; -3{,}750x^2 + 4{,}000x - 1{,}000 = 0$$

This is a **quadratic equation** of the form: $ax^2 + bx + c = 0$, and we can solve it by using the following formula:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \qquad (20)$$

Substituting values in Equation (20), we obtain

$$x = \frac{-4{,}000 \pm \sqrt{(4{,}000)^2 - 4(-1{,}000)(-3{,}750)}}{2(-3{,}750)}$$
$$x = \frac{-4{,}000 \pm 1{,}000}{-7{,}500} = \frac{2}{5}, \frac{2}{3}$$

33. The problem of the multiple rates of return was pointed out by Lorie, J.H. and Savage, L.J., Three Problem in Capital Rationing, *Journal of Business*, 28 (October 1955), pp. 229–39.

NOTES

Since $x = \frac{1}{1+r}$, therefore

$$\frac{1}{1+r} = \frac{2}{5}, \frac{1}{1+r} = \frac{2}{3}$$

$$r = \frac{3}{2} \text{ or } 150\%, r = \frac{1}{2} = 50\%$$

It is obvious from the above calculation that Project I yields dual rates of return: 50 per cent and 150 per cent. At these two rates of return the net present value of the project is zero. It needs to be emphasised here that this dilemma does not arise when the NPV method is used—we have simply to specify the required rate of return and find NPV. The relationship between discount rates and NPVs are shown in Figure 2.4, where the discount rate is plotted along the horizontal axis and net present value along the vertical axis.

At zero rate of discount, the net present value of the project is simply the difference of undiscounted cash flows. It is – Rs 750 for Project I (– 1,000 + 4,000 – 3,750 = – 750). As the discount rate increases, the negative net present value diminishes and becomes zero at 50 per cent. The positive net present value increases as the discount rate exceeds 50 per cent, but reaching a maximum it starts decreasing and at 150 per cent it again becomes zero.

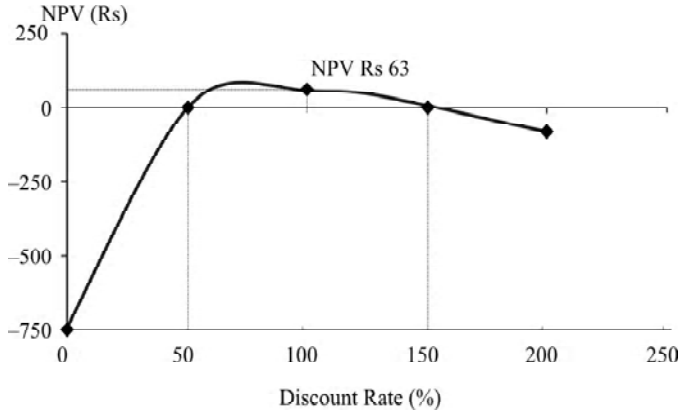


Figure 2.4: Dual rates of return

It should be clear from Figure 2.4 that Project I combines the features of both lending and borrowing.[34] The first part of the figure has an upward slope typical of a loan; the second part has a downward slope typical of an ordinary investment (lending). Since the NPV curve cuts the horizontal-axis twice, the project has two rates of return, 50 and 150 per cent.

Which of the two rates is correct? None. The project would be worthwhile only when the opportunity cost of the capital falls between these two rates; NPV is positive at the discount rates ranging between 50 and 150 per cent.

The number of rates of return depends on the number of times the sign of the cash flow stream changes. In the case of Project I above, there are two reversals of sign (– + –), and there are two rates of return. Reversal of sign is a necessary but not a sufficient condition for multiple rates of return.

A number of adaptations of the IRR criterion have been suggested to take care of the problem of multiple rates. In our opinion, none of them will work satisfactorily. The simple, straightforward alternative is to use the NPV rule.

2.13.4 Difference: Case of Ranking Mutually Exclusive Projects

We have shown that the NPV and IRR methods yield the same accept-or-reject rule in case of independent conventional investments. However, in real business situations there are alternative ways of achieving an objective and, thus, accepting one alternative will mean excluding the other. As defined earlier, investment projects are said to be **mutually exclusive** when only one investment

34. Bierman and Smidt, *op. cit.*, pp. 48–51.

NOTES

could be accepted and others would have to be excluded.[35] For example, in order to distribute its products a company may decide either to establish its own sales organisation or engage outside distributors. The more profitable out of the two alternatives shall be selected. This type of exclusiveness may be referred to as technical exclusiveness. On the other hand, two independent projects may also be mutually exclusive if a financial constraint is imposed. If limited funds are available to accept either Project A or Project B, this would be an example of **financial exclusiveness** or **capital rationing**. The NPV and IRR methods can give conflicting ranking to mutually exclusive projects. In the case of independent projects ranking is not important since all profitable projects will be accepted. Ranking of projects, however, becomes crucial in the case of mutually exclusive projects. Since the NPV and IRR rules can give conflicting ranking to projects, one cannot remain indifferent as to the choice of the rule.

The NPV and IRR rules will give conflicting ranking to the projects under the following conditions:[36]

- The cash flow pattern of the projects may differ. That is, the cash flows of one project may increase over time, while those of others may decrease or *vice versa*.
- The cash outlays (initial investments) of the projects may differ.
- The projects may have different expected lives.

Timing of cash flows The most commonly found condition for the conflict between the NPV and IRR methods is the difference in the timing of cash flows. Let us consider the following two Projects, *M* and *N*.

	Cash Flows (Rs)				*NPV*	
Project	C_0	C_1	C_2	C_3	*at 9%*	*IRR*
M	– 1,680	1,400	700	140	301	23%
N	– 1,680	140	840	1,510	321	17%

At 9 per cent discount rate, project N has higher NPV of Rs 321 than Project *M*'s NPV of Rs 301. However, Project *N* has a lower IRR of 17 per cent than Project *M*'s IRR of 23 per cent. Why this conflict? Which project should we accept? Let us see how NPVs of Projects *M* and *N* behave with discount rates. The NPV profiles of two projects would be as shown in Table 2.5.

The net present values of Projects *M* and *N*, as a function of discount rates, are plotted in Figure 2.5. It is noticeable from the NPV calculations as well as from Figure 2.5 that the present value of Project *N* falls rapidly as the discount rate increases. The reason is that its largest cash flows come late in life, when the compounding effect of time is most significant. Reverse is true with Project *M* as its largest cash flows come early in the life when compounding effect is not so severe. The internal rates of Projects *M* and *N* respectively are 23 per cent and 17 per cent. The NPV profiles of two projects intersect at 10 per cent discount rate. This is called **Fisher's intersection**.[37]

Table 2.5: NPV Profiles of Projects M and N

Discount Rate (%)	*Project M*	*Project N*
0	560	810
5	409	520
10	276	276
15	159	70
20	54	– 106
25	– 40	– 257
30	– 125	– 388

35. Bierman and Smidt, *op. cit*., p. 42.
36. Weston, J.F. and Brigham, E.F., On Capital Budgeting Techniques, in Brigham, E.F. and Johnson, R.E. (Ed.), *Issues in Managerial Finance*, Dryden, 1976, p. 108. Also, see Weston, J.F and Copeland, T.E. *Managerial Finance* Dryden, 1986, pp. 113–20.
37. Fisher, Irwing. *The Rate of Interest*. Macmillan Publishing Co., Inc., 1907.

NOTES

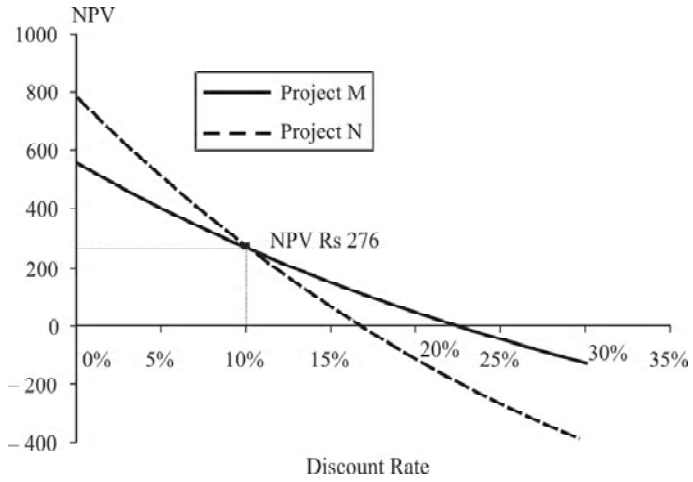


Figure 2.5: NPV versus IRR

Fisher's intersection occurs at the discount rate where the NPVs of two projects are equal. We can determine the discount rate at which Fisher's intersection occurs as follows:

$$-1{,}680+\frac{1400}{(1+r^*)}+\frac{700}{(1+r^*)^2}+\frac{140}{(1+r^*)^3}=-1{,}680+\frac{140}{(1+r^*)}+\frac{840}{(1+r^*)^2}+\frac{1{,}510}{(1+r^*)^3}$$

This equation can be simplified by bringing all terms over the left-hand side.

$$-\frac{1{,}260}{(1+r^*)}+\frac{140}{(1+r^*)^2}+\frac{1{,}370}{(1+r^*)^3}=0$$

Solving for r^*—**Fisher's intersection rate**—by trial and error, we obtain: $r^* = 10\%$.

We can write the following formula for determining the rate at which Fisher's intersection occurs for two Projects *M* and *N*:

$$\text{NPV}_M = \text{NPV}_N$$

$$\sum_{t=1}^{n}\frac{(C_t)_M}{(1+r^*)^t}-(C_0)_M=\sum_{t=1}^{n}\frac{(C_t)_N}{(1+r^*)^t}-(C_0)_N \qquad (21)$$

It is notable from Table 2.5 and Figure 2.5 that at the discount rates less than the intersection rate (10 per cent), Project *N* has the higher NPV but lower IRR (17 per cent). On the other hand, at the discount rates greater than the intersection rate (10 per cent), Project *M* has both higher NPV as well as higher IRR (23 per cent). Thus, if the required rate of return is greater than the intersection rate, both NPV and IRR methods will yield consistent results. That is, the project with higher internal rate of return will also have higher net present value. However, if the required rate of return is less than the intersection rate, the two methods will give contradictory results. That is, the project with higher internal rate of return will have lower net present value and *vice versa*.

Which project should we choose between Projects *M* and *N?* Both projects generate positive net present value at 9 per cent opportunity cost of capital. Therefore, both are profitable. But Project *N* is better since it has a higher NPV. The IRR rule, however, indicates that we should choose Project *M* as it has a higher IRR. If we choose Project *N*, following the NPV rule, we shall be richer by an additional value of Rs 20. Should we have the satisfaction of earning a higher rate of return, or should we like to be richer? The NPV rule is consistent with the objective of maximising wealth. When we have to choose between mutually exclusive projects, the easiest procedure is to compare the NPVs of the projects and choose the one with the larger NPV.

Incremental approach It is argued that the IRR method can still be used to choose between mutually exclusive projects if we adapt it to calculate rate of return on the incremental cash flows. If we prefer Project *N* to Project *M*, there should be *incremental benefits* in doing so. To see this, let us calculate the incremental flows of Project *N* over Project *M*. We obtain the following cash flows:

NOTES

Project	Cash Flows (Rs) C_0	C_1	C_2	C_3	NPV at 9%	IRR
($N - M$)	0	– 1,260	140	1,370	20	10%

The IRR on the incremental flows is 10 per cent. It is more than the opportunity cost of 9 per cent. Therefore, Project *N* should be accepted. Project *N* is better than Project *M* despite its lower IRR because it offers all benefits that Project *M* offers *plus* the opportunity of an incremental investment at 10 per cent—a rate higher than the required rate of return of 9 per cent. It may be noticed that the NPV of the incremental flows is the difference of the NPV of Project *N* over that of Project *M*; this is so because of the value-additivity principle.

The incremental approach is a satisfactory way of salvaging the IRR rule. But the series of incremental cash flows may result in negative and positive cash flows (i.e., lending and borrowing type pattern). This would result in multiple rates of return and ultimately the NPV method will have to be used.

Some people find it difficult to appreciate that the IRR rule can mislead.[38] Let us, for instance, assume that we are considering two mutually exclusive Projects *M* and *N*, and we are also contemplating an investment opportunity, say Project *O*, to occur after one year. Project *O* has the following cash follows:

Project	Cash Flows (Rs) C_0	C_1	C_2	C_3	NPV at 9%	IRR
O	0	– 1,400	700	948	37	11%

We have established so far that Project *N* is better than Project *M*, since it adds more wealth. Still some may argue in favour of Project *M*. Their reasoning could be that if we accept Project *M* today, we would also be able to undertake Project *O* next year that can be financed out of the cash flows generated by Project *M* in the first year. This reasoning implies a capital shortage next year to undertake Project *O* if Project *M* is rejected. In the absence of capital constraint, Project *N* is definitely better (NPV is higher) than Project *M*, and Project *O* can also be accepted next year by raising Rs 1,260 at a rate equal to the cost of capital. It is very unlikely that the large companies would face capital constraint. However, some companies do impose **capital rationing** on their divisions for control purposes. Such impositions are thought to be real constraints by management people at the lower levels. Even if there is a capital constraint, real or self-imposed, the IRR rule cannot be used for ranking projects. The problem under capital rationing is to determine the portfolio of projects, which have the largest net present value satisfying such portfolio. We shall show later on that this problem can be handled through the programming techniques.

Scale of investment Another condition under which the NPV and IRR methods will give contradictory ranking to the projects, is when the cash outlays are of different sizes. Let us consider Projects *A* and *B*, involving following cash flows:

Projects	Cash Flow (Rs) C_0	C_1	NPV at 10%	IRR
A	– 1,000	1,500	364	50%
B	– 100,000	120,000	9,091	20%

Project *A*'s NPV at 10 per cent required rate of return of Rs 364 and IRR is 50 per cent. Project *B*'s NPV at 10 per cent required rate of return is Rs 9,091 and internal rate of return is 20 per cent. Thus, the two projects are ranked differently by the NPV and IRR rules.

As we have explained earlier, the NPV method gives unambiguous results. Since the NPV of Project *B* is high, it should be accepted. The same result will be obtained if we calculate the internal rate of return on the incremental investment:

38. Brealey and Myers, *op. cit.*, pp. 75–77.

NOTES

Project	Cash Flow (Rs) C_0	C_1	NPV at 10%	IRR
(A–B)	– 99,000	118,500	8,727	19.7%

The incremental investment of Rs 99,000 (i.e., Rs 100,000 – Rs 1,000) will generate cash inflow of Rs 118,500 after a year. Thus, the return on the incremental investment is 19.7 per cent, which is in excess of the 10 per cent required rate of return. We should, therefore, prefer Project *B* to Project *A*.

Project life span Difference in the life spans of two mutually exclusive projects can also give rise to the conflict between the NPV and IRR rules. To illustrate, let us consider two mutually exclusive Projects, *X* and *Y*, of significantly different expected lives:

Projects	Cash Flows (Rs) C_0	C_1	C_2	C_3	C_4	C_5	NPV at 10%	IRR
X	– 10,000	12,000	—	—	—	—	909	20%
Y	– 10,000	0	0	0	0	20,120	2,493	15%

Both the projects require initial cash outlays of Rs 10,000 each. Project *X* generates a cash flow of Rs 12,000 at the end of one year, while Project *Y* generated cash flow of Rs 20,120 at the end of fifth year. At 10 per cent required rate of return, Project *X*'s net present value is Rs 908 and internal rate of return is 20 per cent, while Project *Y*'s net present value is Rs 2,495 and internal rate of return is 15 per cent. Thus, the two methods rank the projects differently. The NPV rule can be used to choose between the projects since it is always consistent with the wealth maximisation principle. Thus, Project *Y* should be preferred since it has higher NPV. The problem of choosing between the short and long-lived assets, which have to be replaced in future, is discussed later on.

2.14 REINVESTMENT ASSUMPTION AND MODIFIED INTERNAL RATE OF RETURN (MIRR)

The NPV and IRR rules are sometimes assumed to rest on an underlying *implicit* assumption about reinvestment of the cash flows generated during the lifetime of the project. It is contented that the source of conflict between the two techniques lies in their different **implicit reinvestment rates**.[39] The IRR method is assumed to imply that the cash flows generated by the project can be reinvested at its internal rate of return, whereas the NPV method is thought to assume that the cash flows are reinvested at the opportunity cost of capital. Advocates of the reinvestment assumption calculate **terminal values** of project to prove their point. For example, consider the following projects:

Projects *X* and *Y* are equally attractive if the IRR method is used. The terminal value of Project *Y* is Rs 200. *X* should also have a terminal value of Rs 200 to have same IRR as *Y*. Following the IRR method, the terminal value of *X* would be Rs 200 *only* when its cash flows are assumed to be reinvested at its IRR of 20 per cent. For example, Rs 100 $(1 + 20)^2$ + Rs 56 = Rs 200. Given the initial value (Rs 115.74) and terminal value (Rs 200), the compound average annual return should be equal to IRR as shown below:

Projects	Cash Flows (Rs) C_0	C_1	C_2	C_3	NPV at 10%	IRR
X	– 115.74	100	0	56	17.24	20%
Y	– 115.74	0	0	200	34.52	20%

Check Your Progress

22. Under what circumstances do NPV and IRR methods provide the same results?
23. Is it possible to obtain multiple internal rates of return while evaluating investments?
24. What are mutually exclusive projects?
25. Is it possible to obtain conflicting ranking while using NPV and IRR methods to rank mutually exclusive projects?
26. Distinguish between lending and borrowing types of projects while calculating NPVs.

39. See Rangarajan, C. and Mampilly, Paul, Net Present Value Versus Internal Rate of Return, *Economic and Political Weekly*, Nov. 27, 1971, pp. M-153–56; and Gupta, L.C., A Comment, *Economic and Political Weekly*, Feb. 27, 1972, and "Further Comment", May 6, 1972.

$$\sqrt[3]{\frac{200}{115.74}} - 1 = 0.20 \text{ or } 20\%$$

Some people argue that it is more realistic to use the opportunity cost of capital as the reinvestment rate. If we use 10 per cent as the reinvestment rate, *X*'s terminal value will be Rs 177. Now Project *X*'s compound average annual return would be:

$$\sqrt[3]{\frac{177}{115.74}} - 1 \approx 0.15 \text{ or } 15\%$$

This is a modified internal rate of return. The **modified internal rate of return** (MIRR) is the compound average annual rate that is calculated with a reinvestment rate different than the project's IRR. You can use the Excel function to calculate the MIRR. The Excel built-in function is: MIRR (Values, Finance_Rate Reinvest_Rate), where Values represent the range of cash flows, Finance_Rate is the opportunity cost of capital (the required rate of return) and Reinvest_Rate is the reinvestment rate.

You may notice that when we use 10 per cent – the opportunity cost of capital – as the reinvestment rate, we get *X*'s terminal value less by Rs 23 than the Project *Y*'s terminal value. The present value of Rs 23 at 10 per cent is equal to the difference between the net present values of Projects *X* and *Y* (Rs 34.52 – Rs 17.24) = Rs 23 × 0.751 = Rs 17.28.

Is reinvestment assumption logical? All do not accept the implicit reinvestment assumption vis-à-vis the IRR. They do not consider it valid. According to this view, the source of the implicit reinvestment assumption lies in the use of *compounding* the cash flows to the terminal date of a project, instead of the use of *discounting* to the starting date. Taking the above given example of Project *X*, let us see whether the IRR and NPV calculations depend in any way on the reinvestment assumption:[40]

Project X	***Rs***
Initial investment	115.74
Add: 20% return on investment	23.15
	138.89
Less: Recovery in year 1	100.00
Outstanding investment at the beginning of year 2	38.89
Add: 20% return on outstanding investment	7.78
	46.67
Less: Recovery in year 2	nil
Outstanding investment in the beginning of year 3	46.67
Add: 20% return on outstanding investment	9.33
Outstanding investment	56.00
Less: Recovery in year 3	56.00
Balance	nil

Similar calculations can be made for Project *Y*. What is indicated by these calculations is that 20 per cent return is earned only on the *outstanding balance of investment*. The calculations of IRR and NPV are quite independent of the way in which cash flows are utilised. Let us, for example, consider in the case of Project *X* that Rs 115.74 is a loan made to a small firm by a bank. The loan is to be repaid Rs 100 after 1 year and Rs 56 after 3 years. This is an investment for the bank. If the bank does not reinvest the cash flows occurring on account of the loan repayment, can it be stated that the bank's return is not 20 per cent? No, the rate of return would still remain 20 per cent. The internal rate of return is a time-adjusted percentage of the principal amount outstanding, and it is independent of how cash flows are received and utilised. We would like to add here that we are not implying that the way in which cash flows are put to use will have no effect on the *overall* profitability of the organisation. What is emphasised is that the profitability of the *project under consideration currently* remains unaffected by such reinvestments of cash flows. We feel that

40. Gupta, *op. cit.*

NOTES

Check Your Progress

27. What is the usual assumption regarding the reinvestment rates of the cash flows used by the NPV and IRR methods?
28. What is the modified internal rate of return?

NOTES

the superficial aspects of the mathematics of the IRR rule should not be focussed at the cost of the economic interpretation of the project's cash flows. Economics provides the logical rationale; mathematics is just a *tool* in financial decision-making.

The reason for the ranking-conflict between the IRR and NPV rules lies in the different timing of the projects' cash flows, rather than in the wrongly conceived reinvestment assumption. One can see in Figure 2.5 that NPV falls more rapidly in the case of Project *N* than Project *M* as the discount rate increases. This is so because the more distant flows from a project show a steeper fall in their present value, as compared to earlier flows, as the discount rate increases. Thus the slopes of the NPV curves for different projects will differ because of the difference in the time-patterns of their cash flows. In Figure 2.5, the ranking changes after the point of intersection of the NPV curves. The change in ranking has nothing to do with any assumptions about reinvestment of cash flows.

2.15 VARYING OPPORTUNITY COST OF CAPITAL

We have made a simple assumption that the opportunity cost of capital remains constant over times. This may not be true in reality. If the opportunity cost of capital varies over time, the use of the IRR rule creates problems, as there is not a unique benchmark opportunity cost of capital to compare with IRR.

There is no problem in using NPV method when the opportunity cost of capital varies over time. Each cash flow can be discounted by the relevant opportunity cost of capital as shown below:

$$\text{NPV} = \frac{C_1}{(1+k_1)} + \frac{C_2}{(1+k_2)} + \cdots + \frac{C_n}{(1+k_n)^n} - C_0 \qquad (22)$$

It is clear that for each period there is a different opportunity cost of capital. With which of the several opportunity costs do we compare the IRR to accept or reject an investment project? We cannot compare IRR with any of these costs. To get a comparable opportunity cost of capital, we will have to, in fact, compute a weighted average of these opportunity costs, which is a tedious job. It is, however, much easier to calculate the NPV with several opportunity costs.

2.16 NPV VERSUS PI

The NPV method and PI yield same accept-or-reject rules, because PI can be greater than one only when the project's net present value is positive. In case of marginal projects, NPV will be zero and PI will be equal to one. But a conflict may arise between the two methods if a choice between mutually exclusive projects has to be made.[41] Consider the following illustration where the two methods give different ranking to the projects.

Illustration 2.11

	Project C	*Project D*
PV of cash inflows (Rs)	100,000	50,000
Initial cash outflow (Rs)	50,000	20,000
NPV (Rs)	50,000	30,000
PI	2.00	2.50

Project *C* should be accepted if we use the NPV method, but Project *D* is preferable according to the PI. Which method is better?

The NPV method should be preferred, except under capital rationing, because the net present value represents the net increase in the firm's wealth. In our illustration, Project *C* contributes all that Project *D* contributes plus additional net present value of Rs 20,000 (Rs 50,000 – Rs 30,000) at an incremental cost of Rs 50,000 (Rs 1,00,000 – Rs 50,000). As the net present value of Project *C*'s incremental outlay is positive, it should be accepted. Project *C* will also be acceptable if we calculate the incremental profitability index. This is shown as follows:

Check Your Progress

29. If we want to use the concept of varying opportunity cost of capital, why is the NPV method superior to that of the IRR method?

41. Weston and Brigham, *op. cit.*

Because the incremental investment has a positive net present value, Rs 20,000 and a PI greater than one, Project *C* should be accepted.

If we consider a different situation where two mutually exclusive projects return Rs 100,000 each in terms of net present value and one project costs twice as much as another, the profitability index will obviously give a logical answer. The net present value method will indicate that both are equally desirable in absolute terms. However, the profitability index will evaluate these two projects relatively and will give correct answer. Between two mutually exclusive projects with same NPV, the one with lower initial cost (or higher PI) will be selected.

NOTES

	Project C Rs	*Project D* Rs	*Incremental Flow* Rs
PV of cash inflows (Rs)	100,000	50,000	50,000
Initial cash outlay (Rs)	50,000	20,000	30,000
NPV (Rs)	50,000	30,000	20,000
PI	100,000/50,000 = 2.0	50,000/20,000 = 2.5	50,000/30,000 = 1.67

2.17 INVESTMENT DECISIONS UNDER CAPITAL RATIONING

Firms may have to choose among profitable investment opportunities because of the limited financial resources. In this section, we shall discuss the methods of solving the capital budgeting problems under **capital rationing**. We shall show that the NPV is the most valid selection rule even under the capital rationing situations.

A firm should accept all investment projects with positive NPV in order to maximise the wealth of shareholders. The NPV rule tells us to spend funds in the projects until the NPV of the last (marginal) project is zero.

Consider the following investment projects:

Projects	*Cash Outlay (Rs '000)*	*NPV at 10% (Rs '000)*	*IRR*	*Cumulative Cash Outlay (Rs '000)*	*Cumulative NPV (Rs '000)*
A	200	18.2	20%	200	18.2
B	150	6.8	15%	350	25.0
C	100	0	10%	450	25.0
D	50	(2.3)	5%	500	22.7

The firm will get the highest NPV if it accepts *A* and *B*. Any project between *B* and *C* should also be accepted by the firm. *C* is the marginal project; the firm may or may not accept it since it does not increase or decrease NPV. *D* should be rejected, as its NPV is negative. Thus, the firm may spend Rs 350,000 to obtain the maximum NPV for its shareholders. Suppose the funds available with the firm are limited; it can spend only Rs 200,000. Then it should accept only project *A*, which yields highest NPV and spends the entire budget. Because of the capital constraint, however, the shareholders' wealth will not be maximised. The IRR rule also indicates the same decisions in the case of independent projects, although it can be misleading in a number of situations. In the example, *C* earns a rate of return just equal to the cost of capital (*C* has zero NPV); this is a **marginal project.** Thus, the IRR rule tells us to invest funds in the projects until the marginal rate of return is equal to the cost of capital. Again, because of the limited funds, project *B*, which yields a return (15%) higher than the cost of capital (10%) will have to be foregone.

Check Your Progress

30. Under what circumstances can the NPV and PI methods give different ranking to projects?

NOTES

Capital rationing refers to a situation where the firm is constrained for external, or self-imposed, reasons to obtain necessary funds to invest in all investment projects with positive NPV. Under capital rationing, the management has not simply to determine the profitable investment opportunities, but it has also to decide to obtain that combination of the profitable projects which yields highest NPV within the available funds.

2.17.1 Why Capital Rationing?

Capital rationing may arise due to external factors or internal constraints imposed by the management. Thus there are two types of capital rationing:[42]

- External capital rationing
- Internal capital rationing.

2.17.2 External Capital Rationing

External capital rationing mainly occurs on account of the imperfections in capital markets. Imperfections may be caused by deficiencies in market information, or by rigidities of attitude that hamper the free flow of capital. For example, Supreme Electronics Ltd. is a closely held company. It borrows from the financial institutions as much as it can. It still has investment opportunities, which can be financed by issuing equity capital. But it doesn't issue shares. The owner-managers do not approve the idea of the public issue of shares because of the fear of losing control of the business. Consider another case. Tan India Wattle Extracts Ltd. proposes to set up a plant for manufacturing wattle extract. There is expected to be tremendous demand for wattle extract and therefore, the proposed project is likely to be highly profitable. The prospective investors, however, are not convinced of the prospects of the project. For the company, therefore, the capital markets are non-existent. The NPV rule will not work if shareholders do *not* have access to the capital markets. Imperfections in capital markets alone do not invalidate use of the NPV rule. In reality, we will have very few situations where capital markets do not exist for shareholders.

2.17.3 Internal Capital Rationing

Internal capital rationing is caused by self-imposed restrictions by the management. Various types of constraints may be imposed. For example, it may be decided not to obtain additional funds by incurring debt. This may be a part of the firm's conservative financial policy. Management may fix an arbitrary limit to the amount of funds to be invested by the divisional managers. Sometimes management may resort to capital rationing by requiring a minimum rate of return higher than the cost of capital. Whatever may be the type of restrictions, the implication is that some of the profitable projects will have to be foregone because of the lack of funds. However, the NPV rule will work since shareholders can borrow or lend in the capital markets.

It is quite difficult sometimes to justify the internal capital rationing. But generally it is used as a means of financial control. In a divisional set-up, the divisional managers may overstate their investment requirements. One way of forcing them to carefully assess their investment opportunities and set priorities is to put upper limits to their capital expenditures. Similarly, a company may put investment limits if it finds itself incapable of coping with the strains and organisational problems of a fast growth.

2.17.4 Use of Profitability Index in Capital Rationing

Under capital rationing, we need a method of selecting that portfolio of projects which yields highest possible NPV within the available funds. Let us consider a simple situation where a firm has the following investment opportunities and has a 10% cost of capital.

42. Bierman and Smidt, *op. cit.*, p. 147 and p. 152.

NOTES

Project	Cash Flows (Rs '000) C_0	C_1	C_2	C_3	NPV at 10%	Profitability Index
L	– 50	+ 30	+ 25	+ 20	12.94	1.26
M	– 25	+ 10	+ 20	+ 10	8.12	1.32
N	– 25	+ 10	+ 15	+ 15	7.75	1.31

If the firm has no capital constraint, it should undertake all three projects because they all have positive NPVs. Suppose there is a capital constraint and the firm can spend only Rs 50,000 in year zero, what should the firm do? If the firm strictly follows the NPV rule and starts with the highest individual NPV, it will accept the highest NPV Project *L*, which will exhaust the entire budget. We can, however, see that Projects *M* and *N* together have higher NPV (Rs 15,870) than project *L* (Rs 12,940) and their outlays are within the budget ceiling. The firm should, therefore, undertake *M* and *N* rather than *L* to obtain highest possible NPV. It should be noted that the firm couldn't select projects solely on the basis of individual NPVs when funds are limited. The firm should intend to get the largest benefit for the available funds. That is, those projects should be selected that give the highest ratio of present value to initial outlay. This ratio is the profitability index (PI). In the example, *M* has the highest PI followed by *N* and *L*. If the budget limit is Rs 50,000, we should choose *M* and *N* following the PI rule.

The capital budgeting procedure under the simple situation of capital rationing may be summarised as follows: The NPV rule should be modified while choosing among projects under capital constraint. The objective should be to maximise NPV *per rupee of capital* rather than to maximise NPV. Projects should be ranked by their profitability index, and top-ranked projects should be undertaken until funds are exhausted.

2.17.5 Limitations of Profitability Index

The capital budgeting procedure described above does not always work. It fails in two situations:

- Multi-period capital constraints
- Project indivisibility

A serious limitation in using the PI rule is caused by the **multi-period constraints**. In the above example, there is a budget limit of Rs 50,000 in year 1 also and the firm is anticipating an investment opportunity *O* as in low is year 1. Thus, the decision choices today are as follows:

Project	Cash Flows (Rs '000) C_0	C_1	C_2	C_3	NPV at 10%	Profitability Index	Rank
L	– 50	+ 30	+ 25	+ 20	12.94	1.26	III
M	– 25	+ 10	+ 20	+ 10	8.12	1.32	I
N	– 25	+ 10	+ 15	+ 15	7.75	1.31	II
O	0	– 80	+ 60	+ 40	6.88	1.09	IV

Projects *M* and *N* have first and second ranks in terms of PI. They together have highest NPV and also exhaust the budget in year 0; so the firm would choose them. Further, projects *M* and *N* together are expected to generate Rs 20,000 cash flow next year. This amount with the next year's budget (i.e., Rs 20,000 + Rs 50,000 = Rs 70,000) is not sufficient to accept Project *O*. Thus, by accepting projects *M* and *N*, the firm will obtain a total NPV of Rs 15,870. However, a careful examination of the projects' cash flows reveals that if project *L* is accepted now it is expected to generate a cash flow of Rs 30,000 after a year, which together with the budget of Rs 50,000 is sufficient to undertake Project *O* next year. Projects *L* and *O* have lower PI ranks than Projects *M* and *N*, but they have higher total NPV of Rs 19,820.

The PI rule of selecting projects under capital rationing can also fail because of **project indivisibility**. It may be more desirable to accept many lower ranked smaller projects than a single large project.

NOTES

The acceptance of a single large project, which may be top-ranked, excludes the possibility of accepting small projects, which may have higher total NPV. Consider the following projects:

Project	*Outlay (Rs)*	*NPV (Rs)*	*PI*	*Rank*
A	500,000	1,10,000	1.22	1
B	150,000	(7,500)	0.95	6
C	350,000	70,000	1.20	2
D	450,000	81,000	1.18	4
E	200,000	38,000	1.19	3
F	400,000	20,000	1.05	5

Suppose that the firm has a budget ceiling of Rs 10 lakh (i.e., Rs 1 million). Following the ranking by PI, the firm would choose *A* and *C*. These projects spend Rs 850,000 of the total a budget and have a total NPV of Rs 180,000. The next best project *E* needs an investment of Rs 200,000, while the firm has only Rs 150,000. If we examine the various combinations of projects satisfying the budget limit, we find the package of *C*, *E* and *D* as the best. They exhaust the entire budget and have a total NPV of Rs 189,000. Thus the firm can choose two lower ranked, small projects, *E* and *D*, in place of the high ranked, large project, *A*. The selection procedure will become very unwieldy if the firm has to choose the best package of projects from a large number of profitable projects.

Our discussion has shown that the profitability index can be used to choose projects under simple, one-period, capital constraint situation. It breaks down in the case of multi-period capital constraints. It will also not work when any other constraint is imposed, or when mutually exclusive projects, or dependent projects are being considered.

2.18 LET US SUMMARIZE

1. Investments involve cash flows. Profitability of an investment project is determined by evaluating its cash flows.
2. Capital budgeting process involves a process of facilitating decisions which cover expenditures on long-term assets. They encompass both tangible and intangible assets.
3. Phases of expenditure planning and control include identification of investment opportunities, forecasting benefits and costs, authorisation of capital expenditure and control of capital projects.
4. NPV, IRR and PI are the discounted cash flow (DCF) criteria for appraising the worth of an investment project.
5. The net present value (NPV) method is a process of calculating the present value of the project's cash flows, using the opportunity cost of capital as the discount rate, and finding out the net present value by subtracting the initial investment from the present value of cash flows.
6. Under the NPV method, the investment project is accepted if its net present value is positive (NPV > 0). The market value of the firm's share is expected to increase by the project's positive NPV. Between the mutually exclusive projects, the one with the highest NPV will be chosen.
7. The internal rate of return (IRR) is that discount rate at which the project's net present value is zero. Under the IRR rule, the project will be accepted when its internal rate of return is higher than the opportunity cost of capital (IRR > k).
8. Both IRR and NPV methods account for the time value of money and are generally consistent with the wealth maximisation objective. They give same accept-reject results in case of conventional independent projects.
9. Under a number of situations, the IRR rule can give a misleading signal for mutually exclusive projects. The IRR rule also yields multiple rates of return for non-conventional projects and fails to work under varying cost of capital conditions. Since the IRR violates the value-additivity principle; since it may fail to maximise wealth under certain conditions; and since it is cumbersome, the use of the NPV rule is recommended.

Check Your Progress

31. What is capital rationing? How do we usually choose projects under capital rationing?

NOTES

10. Profitability index (PI) is the ratio of the present value of cash inflows to initial cash outlay. It is a variation of the NPV rule. PI specifies that the project should be accepted when it has a profitability index greater than one (PI > 1.0) since this implies a positive NPV.
11. A conflict of ranking can arise between the NPV and PI rules in case of mutually exclusive projects. Under such a situation, the NPV rule should be preferred since it is consistent with the wealth maximisation principle.
12. In practice, two other methods have found favour with the business executives. They are the payback (PB) and accounting rate of return (ARR) methods.
13. PB is the number of years required to recoup the initial cash outlay of an investment project. The project would be accepted if its payback is less than the standard payback. The greatest limitations of this method are that it does not consider the time value of money, and does not consider cash flows after the payback period.
14. The discounted payback considers the time value of money, but like the simple payback it also ignores cash flows after the payback period. Under the conditions of constant cash flows and a long life of the project, the reciprocal of payback can be a good approximation of the project's rate of return.
15. ARR is found out by dividing the average net operating profit after-tax by the average amount of investment. A project is accepted if its ARR is greater than a cut off rate (arbitrarily selected). This method is based on accounting flows rather than cash flows; therefore, it does not account for the time value of money. Like PB, it is also not consistent with the objective of the shareholders' wealth maximisation.
16. Table 2.6 provides a summary of the features of various investment criteria.
17. Capital rationing is a situation wherein a firm may be constrained for external or internal reasons to obtain necessary funds to invest in all projects with positive NPV.

Table 2.6: Summaries of Investment Criteria

I. Discounted Cash Flow Methods

1. *Net present value (NPV):* The difference between PV of cash flows and PV of cash outflows is equal to NPV; the firm's opportunity cost of capital being the discount rate.

$$\text{NPV} = \left[\frac{C_1}{(1+k)} + \frac{C_2}{(1+k)^2} + \frac{C_3}{(1+k)^3} + \cdots + \frac{C_n}{(1+k)^n}\right] - C_0$$

$$\text{NPV} = \sum_{t=1}^{n} \frac{C_t}{(1+k)^t} - C_0$$

Acceptance rule

- Accept if NPV > 0 (i.e., NPV is positive)
- Reject if NPV < 0 (i.e., NPV is negative)
- Project may be accepted if NPV = 0

Merits	***Demerits***
• Considers all cash flows	• Requires estimates of cash flows which is a tedious task
• True measure of profitability	• Requires computation of the opportunity cost of capital which poses practical diffi-culties
• Based on the concept of the time value of money	• Sensitive to discount rates
• Satisfies the value-additivity principle (i.e., NPV's of two or more projects can be added)	
• Consistent with the share-holders' wealth maximisation (SWM) principle.	

2. *Internal rate of return (IRR):* The discount rate which equates the present value of an investment's cash inflows and outflows is its internal rate of return.

$$\left[\frac{C_1}{(1+r)} + \frac{C_2}{(1+r)^2} + \frac{C_3}{(1+r)^3} + \cdots + \frac{C_n}{(1+r)^n}\right] = C_0$$

NOTES

$$NPV = \sum_{t=1}^{n} \frac{C_t}{(1+r)^t} - C_0 = 0$$

Acceptance rule

- Accept if IRR > k
- Reject if IRR < k
- Project may be accepted if IRR = k

Merits	*Demerits*
• Considers all cash flows	• Requires estimates of cash flows which is a tedious task
• True measure of profitability	• Does not hold the value additivity principle (i.e., IRRs of two or more projects do not add)
• Based on the concept of the time value of money	• At times fails to indicate correct choice between mutually exclusive projects
• Generally, consistent with wealth maximisation principle	• At times yields multiple rates • Relatively difficult to compute

3. *Profitability index (PI):* The ratio of the present value of the cash flows to the initial outlay is profitability index or benefit-cost ratio:

$$PI = \frac{\text{PV of Annual Cash Flows}}{\text{Initial Investment}}$$

$$PI = \frac{\sum_{t=1}^{n} \frac{C_t}{(1+k)^t}}{C_0}$$

Acceptance rule

- Accept if PI > 1.0
- Reject if PI < 1.0
- Project may be accepted if PI = 1.0

Merits	*Demerits*
• Considers all cash flows	• Requires estimates of the cash flows which is a tedious task
• Recognises the time value of money	• At times fails to indicate correct choice between mutually exclusive projects
• Relative measure of profita-bility	
• Generally consistent with the wealth maximisation principle	

II. Non-Discounted Cash Flow Criteria

4. *Payback (PB):* The number of years required to recover the initial outlay of the investment is called payback.

$$PB = \frac{\text{Initial Investment}}{\text{Annual Cash Flow}} = \frac{C_0}{C}$$

Acceptance rule

- Accept if PB < standard payback
- Reject if PB > standard payback

Merits	*Demerits*
• Easy to understand and compute and inexpensive to use	• Ignores the time value of money
• Emphasises liquidity	• Ignores cash flows occurring after the payback period
• Easy and crude way to cope	• Not a measure of profitability with risk
• Uses cash flows information	• No objective way to determine the standard payback
• No relation with the wealth maximisation principle	

5. *Discount payback:* The number of years required in recovering the cash outlay on the present value basis is the discounted payable period. Except using discounted cash flows in calculating payback, this method has all the demerits of payback method.

6. *Accounting rate of return (ARR):* An average rate of return found by dividing the average net operating profit [EBIT $(1 - T)$] by the average investment.

$$\text{ARR} = \frac{\text{Average Net Operating Profit after Tax}}{\text{Average Investment}}$$

Acceptance rule

- Accept if ARR > minimum rate
- Reject if ARR < minimum rate

Merits	***Demerits***
• Uses accounting data with which executives are familiar	• Ignores the time value of money
• Easy to understand and calculate	• Does not use cash flows
• Gives more weightage to future receipts	• No objective way to determine the minimum acceptable rate of return

Conclusion: Net present value (NPV) method is the most superior investment criterion as it is always consistent with the wealth maximisation principle.

2.19 KEY CONCEPTS

Accounting rate of return	Benefit-cost ratio	Borrowing-type projects
Capital rationing	Contingent investments	
Cost-reduction investments	Cut-off rate	Discounted payback
Diversification	Expansion	Fisher's intersection
Hurdle rate	Incremental approach	Independent investments
Internal rate of return	Investment yield	Lending-type projects
Marginal efficiency of capital	Marginal investment	Modernisation
Multiple rates of return	Mutually exclusive investments	
Net present value	Non-conventional investments	
Opportunity cost of capital	Payable reciprocal	Profitability index
Reinvestment rate	Replacement decisions	Return on investment
Revenue-expansion investments	Time-adjusted rate of return	Value-additivity principle

2.20 ILLUSTRATIVE SOLVED PROBLEMS

Problem 2.1 A company is considering the following investment projects:

	Cash Flows (Rs)			
Projects	C_0	C_1	C_2	C_3
A	– 10,000	+ 10,000		
B	– 10,000	+ 7,500	+ 7,500	
C	– 10,000	+ 2,000	+ 4,000	+ 12,000
D	– 10,000	+ 10,000	+ 3,000	+ 3,000

(*a*) Rank the project according to each of the following methods: (*i*) Payback, (*ii*) ARR, (*iii*) IRR and (*iv*) NPV, assuming discount rates of 10 and 30 per cent.

(*b*) Assuming the projects are independent, which one should be accepted? If the projects are mutually exclusive, which project is the best?

NOTES

Solution

(*a*) (*i*) **Payback**

Project A : 10,000/10,000 = 1 yr.

Project B : 10,000/7,500 = $1^1/_3$ yrs.

Project C : $2 \text{ yrs} + \frac{10,000 - 6,000}{12,000} = 2\frac{1}{2}$ yrs.

Project D : 1 yr.

(*ii*) **ARR**

Project A : $\frac{(10,000 - 10,000)1/2}{(10,000)1/2} = 0$

Project B : $\frac{(15,000 - 10,000)1/2}{(10,000)1/2} = \frac{2,500}{5,000} = 50\%$

Project C : $\frac{(18,000 - 10,000)1/3}{(10,000)1/2} = \frac{2,667}{5,000} = 53\%$

Project D : $\frac{(16,000 - 10,000)1/3}{(10,000)1/2} = \frac{2,000}{5,000} = 40\%$

Note: The net cash proceeds include recovery of investment also. Therefore, net cash earnings are found by deducting initial investment.

(*iii*) **IRR**

Project A: The net cash proceeds in year 1 are just equal to investment. Therefore, $r = 0\%$.

Project B: This project produces an annuity of Rs 7,500 for two years. Therefore, the required PVAF is: 10,000/7,500 = 1.33. Looking in Table D across 2 year row, this factor is found under 32% column. Therefore, $r = 32\%$.

Project C: Since cash flows are uneven, the trial and error method will have to be followed. Let us try 20% rate of discount. The NPV is + Rs 1,389. A higher rate should be tried. At 30% rate of discount, the NPV is – Rs 633. The true rate of return should be less than 30%. At 27% rate of discount we find that the NPV is – Rs 86 and at 26% + Rs 105. Through interpolation, we find $r = 26.5\%$.

Project D: In this case also we use the trial and error method, and find that at 37.6% rate of discoutnt NPV becomes almost zero. Therefore, r = 37.6%.

(*iv*) **NPV**

Project A :

at 10% $-10,000 + 10,000 \times 0.909 = -910$

at 30% $-10,000 + 10,000 \times 0.769 = -2,310$

Project B :

at 10% $-10,000 + 7,500\,(0.909 + 0.826) = +3,013$

at 30% $-10,000 + 7,500\,(0.769 + 0.592) = +208$

Project C :

at 10% $-10,000 + 2,000 \times 0.909 + 4,000 \times 0.826 + 12,000 \times 0.751 = +4,134$

at 30% $-10,000 + 2,000 \times 0.769 + 4,000 \times 0.592 + 12,000 \times 0.455 = -633$

Project D :

at 10% $-10,000 + 10,000 \times 0.909 + 3,000 \times (0.826 + 0.751) = +3,821$

at 30% $-10,000 + 10,000 \times 0.769 + 3,000 \times (0.592 + 0.4555) = +831$

The projects are ranked as follows according to the various methods:

	Ranks				
Project	**PB**	**ARR**	**IRR**	**NPV-10%**	**NPV-30%**
A	1	4	4	4	4
B	2	2	2	3	2
C	3	1	3	1	3
D	1	3	1	2	1

(*b*) Payback and ARR are theoretically unsound methods for choosing between the investment projects. Between the two time-adjusted (DCF) investment criteria, NPV and IRR, NPV gives consistent results. If the projects are independent (and there is no capital rationing), either IRR or NPV can be used since the same set of projects will be accepted by any of the methods. In the present case, except Project *A* all the three projects should be accepted if the discount rate is 10%. Only Projects *B* and *D* should be undertaken if the discount rate is 30%.

If we assume that the projects are mutually exclusive, then under the assumption of 30% discount rate, the choice is between *B* and *D* (*A* and *C* are unprofitable). Both criteria IRR and NPV give the same results—*D* is the best. Under the assumption of 10% discount rate, rankings according to IRR and NPV conflict (except for Project *A*). If we follow the IRR rule, Project *D* should be accepted. But the NPV rule tells that Project *C* is the best. The NPV rule generally gives consistent results in conformity with the wealth maximisation principle. We would, therefore, accept Project *C* following the NPV rule.

Problem 2.2 The cash flows of Projects *C* and *D* in Problem 2.1 are reproduced below:

	Cash Flows (Rs)					
Projects	C_0	C_1	C_2	C_3	**NPV at 10%**	**IRR**
C	– 10,000	+ 2,000	+ 4,000	+ 12,000	+ 4,134	26.5%
D	– 10,000	+ 10,000	+ 3,000	+ 3,000	+ 3,821	37.6%

(*a*) Why is there a conflict of rankings?

(*b*) Why should you recommend Project *C* in spite of a lower rate of return?

Solution

(*a*) Suppose the discount rate as 0, 10, 15, 30 and 40 per cent. The NPV for each of the projects is given below:

Discount Rate (%)	NPV (Rs)	
	C	**D**
0	8,000	6,000
10	4,134	3,821
15	2,660	2,942
30	– 634	831
40	– 2,164	– 238

It is noticeable that for Project *C*, the larger cash flows occur later in its life. At the lower discount rates, Project *C*'s NPV will be higher than that of Project *D*. As discount rates start increasing, Project *C*'s NPV will, however, fall at a faster rate simply because its largest cash flows come late in life when the compounding effects of timings are most significant. Till the discount rate reaches 12.5%, Project *C* has higher NPV than Project *D*. After this break-even discount rate, Project *D* has higher NPV as well as higher IRR. Thus the rankings of the projects have differed because of the difference in time-patterns of cash flows.

NOTES

NOTES

(*b*) If the opportunity cost of capital is 10%, Project *C* should be undertaken because the firm will be richer by additional Rs 313 (i.e., Rs 4,134 – Rs 3,821). This can be better appreciated if we calculate the profitability of the incremental investment (*C* – *D*).

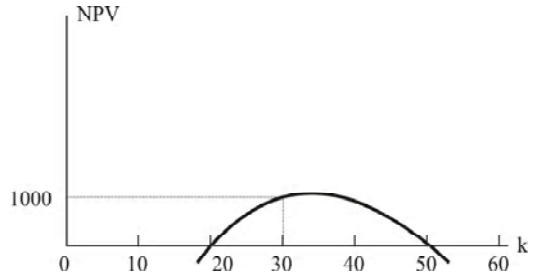
	Cash Flows (Rs)					
Project	C_0	C_1	C_2	C_3	**NPV at 10%**	**IRR**
C – *D*	0	– 8,000	+ 1,000	+ 9,000	+ 313	12.5%

The incremental Project *C*– *D* involves an outlay of Rs 8,000 in year 1 and produces cash inflows Rs 1,000 and Rs 9,000 in years 2 and 3. At 10% opportunity cost of capital, the NPV is positive, Rs 313. The IRR is 12.5%. What does this imply? It implies that Project *C* has all the benefits of Project *D* as well as gives additional wealth.

Problem 2.3 An investment project has two internal rates of return, 20 and 50 per cent. The investment's NPV at 30 per cent discount rate is + Rs 1,000. Would the project be acceptable if the discount rate is: (*a*) 40 per cent, (*b*) 10 per cent, and (*c*) 60 per cent. Draw NPV graph to justify your answer.

Solution

The investment in question has features of both lending and borrowing. It can be seen from the graph that NPV is positive *if* discount rate lies within 20 per cent and 50 per cent range. Therefore, the investment should be accepted at 40 per cent discount rate ($\therefore$ NPV > 0) and rejected at 10 and 60 per cent ($\therefore$ NPV < 0).



Problem 2.4 A company is considering an investment proposal, involving an initial cash outlay of Rs 45 lakh. The proposal has an expected life of 7 years and zero salvage value. At a required rate of return of 12 per cent, the proposal has a profitability index of 1.182. Calculate the annual cash inflows.

Solution

$$\text{PI} = \frac{\sum_{t=1}^{7} \frac{A}{(1+0.12)^t}}{45} = 1.182$$

$$A \times 4{,}564 = 45 \times 1.182$$

$$A = 53.19 / 4.564 = \text{Rs}\,11.65 \text{ lakh}$$

Problem 2.5 Equipment A has a cost of Rs 75,000 and net cash flow of Rs 20,000 per year for six years. A substitute equipment *B* would cost Rs 50,000 and generate net cash flow of Rs 14,000 per year for six years. The required rate of return of both equipments is 11 per cent. Calculate the IRR and NPV for the equipments. Which equipment should be accepted and why?

Solution *Equipment A:*

$$\text{NPV} = 20{,}000 \times \text{PVAF}_{6,0.11} - 75{,}000$$

$$= 20{,}000 \times 4.231 - 75{,}000$$

$$= 84{,}620 - 75{,}000 = \text{Rs}\,9{,}620$$

$$\text{IRR} = 20{,}000 \times \text{PVAF}_{6,r} = 75{,}000$$

$$\text{PVAF}_{6,r} = 75{,}000 / 20{,}000 = 3.75$$

From the present value of an annuity table, we find:

$$PVAF_{6,0.15} = 3.784$$
$$PVAF_{6,0.16} = 3.685$$

NOTES

Therefore,

$$IRR = r = 0.15 + 0.01\left[\frac{3.784 - 3.75}{3.784 - 3.685}\right]$$
$$= 0.15 + 0.0034 = 0.1534 \text{ or } 15.34\%$$

Equipment B:

$$NPV = 14{,}000 \times PVAF_{6,0.11} - 50{,}000$$
$$= 14{,}000 \times 4.231 - 50{,}000$$
$$= 59{,}234 - 50{,}000 = \text{Rs } 9{,}234$$
$$IRR = 14{,}000 \times PVAF_{6,r} = 75{,}000$$
$$PVAF_{6,r} = 3.571$$

From the present value of an annuity table, we find:

$$PVAF_{6,0.17} = 3.589$$
$$PVAF_{6,0.18} = 3.498$$

Therefore,

$$IRR = r = 0.17 + 0.01\left[\frac{3.589 - 3.571}{3.589 - 3.498}\right]$$
$$= 0.17 + 0.002 = 0.172 \text{ or } 17.20\%$$

Equipment *A* has a higher NPV but lower IRR as compared with equipment *B*. Therefore equipment *A* should be preferred since the wealth of the shareholders will be maximised.

2.21 ANSWERS TO 'CHECK YOUR PROGRESS'

1. A capital budgeting decision is a decision to invest the firm's funds most efficiently in anticipation of a projected flow of benefits (measured in cash flows) over a number of years in future.
2. Long term assets are those assets which affect a firm's operations beyond one year.
3. A firm's long term investment decisions would generally include expansion, acquisition, modernization and replacement of long term assets. Sale of long term assets is also considered an investment decision. Further, business decisions which have long term implications like research and development programmes, advertising campaigns, etc. should also be treated as investment decisions.
4. The reasons are as follows: (1) Growth: Investment decisions affect the firm's growth in the long run. (2) Commitment of funds: Usually, in capital budgeting decisions, large amounts of funds have to be committed. Once this large quantum of funds is invested in long term assets, the decision is irreversible, or reversible at a substantial cost. (3) Risk: Given the nature of capital budgeting decisions, the overall riskiness of the firm may also be considerably affected. (4) Complexities: Finally, investment decisions are complex decisions, as such decisions have to take into account a large number of factors which are uncertain and difficult to predict. Economic, political, social and technological factors cause uncertainty in future incomes.
5. There a number of ways to classify investment decisions. One of the acceptable ways of classifying capital budgeting decisions is: expansion and diversification projects, replacement and modernization projects, mutually exclusive projects, independent investments and contingent investments.

NOTES

6. In the case of expansion and diversification projects, a firm puts in fresh capacities. The other option is to acquire existing firms to expand business. The basic purpose is to expand the revenue streams of the business. On the other hand, the main objective of modernisation and replacement type of investment decisions is to improve operating efficiency and reduce costs. The resultant cost savings will lead to increased profits, often without increasing the firm's revenues. Such replacement investments are often known as cost-reduction investments. However, replacement decisions may also involve substantial modernisation and technological improvements that expand revenues as well as reduce costs. Generally, replacement and modernisation decisions are less risky than expansion and diversification decisions.
7. Capital investments basically include expenditure on long-term assets. However, as such assets benefit the firm over a long period of time, they include both tangible and intangible assets. Tangible assets include fixed assets, while intangible assets include items such as expenditure incurred in acquiring a patent or brand, R&D expenditure, advertisements, training of employees, etc.
8. Major phases of capital expenditure planning and control include: identification of investment projects, development of forecasts of benefits and costs, evaluation of net benefits, authorisation of capital expenditure, incurring the capital expenditure, and finally setting up a system of monitoring and control of investment projects.
9. The main methods of evaluation of investment projects could be divided into discounted cash flow (DCF) criteria and non-discounted cash flow criteria. The main DCF techniques are net present value (NPV), internal rate of return (IRR) and profitability index (PI). On the other hand, the major non-discounted cash flow techniques are payback period and accounting rate of return (ARR) methods.
10. The two main categories for assessment of capital budgeting decisions are non-discounted cash flow criteria and discounted cash flow criteria. The discounted cash flow techniques use cash flows and take into account the time value of money. The non-discounted cash flow criteria may measure benefits either in cash flows or non-cash flows terms but they not consider the time value of money.
11. The first step is to forecast on a realistic basis the cash flows of the proposed project. The forecasted cash flows then should be discounted with the appropriate discount rate, otherwise known as the cost of capital. The net present value is then arrived at by subtracting present value of cash outflows from present value of cash inflows. The project is acceptable if the net present value is positive and rejected if net present value is negative.
12. It is well-accepted that the best way to measure returns from a proposed project is to estimate the future cash flows of a project. This avoids the ambiguities of different accounting systems. The NPV method measures all cash flows occurring over the entire life of the project. After the future cash flows are projected, the NPV method discounts the cash flows with the cost of capital (or the opportunity cost of capital) which reflects the risk and the missed opportunities in the financial market. Hence the NPV method takes into account the time value of money and risk. Finally, a project is found acceptable only if the net present value is positive, that is discounted cash inflows exceed discounted cash outflows. This approach is consistent with the objective of shareholder value maximisation.

    However, in spite of its obvious strengths, there are difficulties in using the NPV method. First, it is not easy to forecast cash flows accurately. There are also difficulties in arriving at the cost of capital or the discount rate that we use to discount the cash flows. In the case of alternative or mutually exclusive projects, a project which yields a higher amount of NPV may also be more expensive to implement. This means that a company with funds constraint may prefer a lower cost project. Finally, the ranking of investment projects are not independent of the discount rates. This means that as the discount rate or cost of capital changes, the ranking of projects may vary.
13. In this case, as in the NPV method, the projected cash flows of the project are estimated on a realistic basis. The IRR is the rate that equates the investment outlay with the present value of the cash inflows. As the cash inflows from the proposed project are uneven, the IRR has to be calculated by a trial and error method.

NOTES

14. Under the IRR method, if we find that the calculated internal rate of return exceeds the assumed opportunity cost of capital we accept the proposal; otherwise we reject it. This minimum rate of return is sometimes known as the cut-off or hurdle rate.
15. In the NPV method, the required rate of return is given, and this required rate of return or cost of capital is used to calculate the present value of the projected cash inflows, and hence the NPV of the project. On the other hand, in the IRR method, the rate of discount is not externally given, but is determined from the calculation itself. Basically, in the IRR method we determine the rate of return at which the net present value becomes zero.
16. Both the NPV method and the Profitability Index method recognises the time value of money. However, in the Profitability Index method, the present value of cash flows is divided by the initial cash outlay, and thus we have a relative measure of a project's profitability.
17. Payback is defined as the number of years required to recover the original cash outlay invested in a project. It is very simple to calculate as we obtain Payback period of a project by the cash flows obtained on an annual basis.
18. The Payback system has serious limitations as it does not take into account time value of money. Further, it does not take into account cash flows earned after the payback period.
19. The Discounted Payback Period Method used cash flows adjusted (discounted) for time value of money. Since in the discounted payback period method uses discounted cash flows, it is an improvement over the payback method. However, the discounted payback method continues to ignore the cash flows occurring after the payback period.
20. ARR is the ratio of average profit and average investment. It calculated from the accounting data which is available from the projected financial statements of the proposed project.
21. Finance experts are agreed that the best methods for evaluating project returns use cash flows. However, ARR method uses accounting profits and not cash flows while appraising projects. ARR thus often includes non-cash items. Further, the ARR method ignores time value of money. Overall, dependence on the ARR method for evaluating projects may lead to inefficient allocation of capital.
22. In the case of conventional projects, which are economically independent of each other, NPV and IRR methods provide the same accept-reject decisions, only if the firm is not constrained by funds availability.
23. It is possible to obtain multiple rates of return while evaluating non-conventional investments, that is investments which have cash outflows mingled with cash inflows throughout the life of the projects.
24. Investment projects can be said to be mutually exclusive when only one investment could be accepted and others would have to be excluded. This type of mutual exclusion could arise on account of technical reasons. On the other hand, two independent projects may be mutually exclusive if a firm faces capital constraints and cannot implement both projects.
25. Yes, under some circumstances like different cash flow patterns, different levels of initial investments and different expected lives, the two methods may give conflicting ranking of mutually exclusive projects.
26. In a typical lending type of project, a series of cash outflows is followed by a series of cash inflows. In such a case, as we increase the discount rate, the NPV of the project declines. If the NPV is positive when the discount rate used is the opportunity cost of capital, then the proposed project is acceptable. On the other hand, in the case of a borrowing type of project, the discount rate used is a cost. In such a case the borrower will be better off, the lower the discount rate or borrowing rate. The borrower will be well off only he could borrow at a rate which is less than the opportunity cost of capital. Thus he is better off if the NPV is negative.
27. It is usually assumed that in the IRR method the cash flows generated by the project are reinvested at its internal rate of return. On the other hand, in the NPV method, the cash flows are reinvested at the opportunity cost of capital.
28. The MIRR may be defined as the compound average annual rate that is calculated with a reinvestment rate different from the project's IRR.

NOTES

29. The NPV method is superior if the opportunity cost of capital varies. This is because the NPV method can easily discount each cash flow by the relevant opportunity cost of capital. On the other hand, the IRR method yields a single discount rate. It is difficult to compare several opportunity costs with the IRR.
30. The two methods may provide different ranking of projects in the case of mutually exclusive projects. In general the NPV method is preferred, except under capital rationing, as the NPV represents the net increase in the firm's wealth. However, if the NPV is the same for two projects, but one project is more costly, then the project with the lower cost and thus higher PI would be preferred.
31. Capital rationing refers to a situation where the firm faces constraints in obtaining necessary funds to invest in all investment projects with positive NPV. Capital rationing may arise due to external factors or internal controls imposed by the management. Under capital rationing, we need a method of selecting that portfolio of projects which yields the highest possible NPV within the available funds. The use of profitability index in capital rationing type of situation is common.

2.22 QUESTIONS AND EXERCISES

Review Questions

1. What is capital budgeting? Why is it significant for a firm?
2. Who generates investment ideas within a firms?
3. Despite its weaknesses, the payback period method is popular in practice? What are the reasons for its popularity?
4. How do you calculate the accounting rate of return? What are its limitations?
5. Explain the merits and demerits of the time-adjusted methods of evaluating the investment projects.
6. What is meant by the term value of money? Which capital budgeting methods take into consideration this concept? How is it possible for the capital budgeting methods that do not consider the time value of money to lead to wrong capital budgeting decisions?
7. Under what circumstances do the net present value and internal rate of return methods differ? Which method would you prefer and why?
8. What are the mutually exclusive projects? Explain the conditions when conflicting ranking would be given by the internal rate of return and net present value methods to such projects.
9. What is profitability index? Which is a superior ranking criterion, profitability index or the net present value?
10. Under what conditions would the internal rate of return be a reciprocal of the payback period?
11. "The payback reciprocal has wide applicability as a meaningful approximation of the time adjusted rate of return. But it suffers from certain major limitations." Explain.
12. Comment on the following statements:
    (*a*) "We use payback primarily as a method of coping with risk."
    (*b*) "The virtue of the IRR rule is that it does not require the computation of the required rate of return."
    (*c*) "The average accounting rate of return fails to give weight to the later cash flows."
13. "Discounted payback ensures that you don't accept an investment with negative NPV, but it can't stop you from rejecting projects with a positive NPV." Illustrate why this can happen.
14. What are the limitations of Profitability Index in the capital budgeting process?

NOTES

Exercises

1. The following are the net cash flows of an investment project:

Cash Flows (Rs)		
C_0	C_1	C_2
– 5,400	+ 3,600	+ 14,400

Calculate the net present value of the project at discount rates of 0, 10, 40, 50 and 100 per cent.

2. A machine will cost Rs 100,000 and will provide annual net cash inflow of Rs 30,000 for six years. The cost of capital is 15 per cent. Calculate the machine's net present value and the internal rate of return. Should the machine be purchased?

3. A project costs Rs 81,000 and is expected to generate net cash inflow of Rs 40,000, Rs 35,000 and Rs 30,000 over its life of 3 years. Calculate the internal rate of return of the project.

4. The G.K. Company is evaluating a project with following cash inflows:

Cash Flows (Rs)				
C_1	C_2	C_3	C_4	C_5
1,000	800	600	400	200

The cost of capital is 12 per cent. What is the maximum amount the company should pay for the machine?

5. Consider the following three investments:

	Cash Flows (Rs)		
Projects	C_0	C_1	C_2
X	– 2,500	0	+ 3,305
Y	– 2,500	+ 1,540	+ 1,540
Z	– 2,500	+ 2,875	0

The discount rate is 12 per cent. Compute the net present value and the rate of return for each project.

6. You want to buy a 285 litre refrigerator for Rs 10,000 on an instalment basis. A distributor is prepared to sell the refrigerator on instalments. He states that the payments will be made in four years, interest rate being 12 per cent. The annual payments will be as follows:

	Rs
Principal	10,000
Four year of interest at 12%, i.e., Rs 10,000 × 0.12 × 4	4,800
	14,800
Annual payments (Rs 14,800 ÷ 4)	3,700

What rate of return is the distributor earning? If your opportunity cost of capital is 14 per cent will you accept the offer? Why?

7. Compute the rate of return of the following projects:

	Cash Flows (Rs)			
Projects	C_0	C_1	C_2	C_3
X	– 20,000	+ 8,326	+ 8,326	+ 8,326
Q	– 20,000	0	0	+ 24,978

Which project would you recommend? Why?

NOTES

8. A firm is considering the following two mutually exclusive investments:

	Cash Flows (Rs)			
Projects	C_0	C_1	C_2	C_3
A	– 25,000	+ 5,000	+ 5,000	+ 25,640
B	– 28,000	+ 12,672	+ 12,672	+ 12,672

The cost of capital is 12 per cent. Compute the NPV and IRR for each project. Which project should be undertaken? Why?

9. You have an opportunity cost of capital of 15 per cent. Will you accept the following investment?

Cash Flows (Rs)	
C_0	C_1
+ 50,000	– 56,000

10. Is the following investment desirable if the opportunity cost of capital is 10 per cent:

Cash Flows (Rs)				
C_0	C_1	C_2	C_3	C_4
+ 100,000	– 33,625	– 33,625	– 33,625	– 33,625

11. Consider the following two mutually exclusive investments:

	Cash Flows (Rs)			
Projects	C_0	C_1	C_2	C_3
A	– 10,000	+ 2,000	+ 4,000	+ 11,784
B	– 10,000	+ 10,000	+ 3,000	+ 2,830

(*a*) Calculate the NPV for each project assuming discount rates of 0, 5, 10, 20, 30 and 40 per cent; (*b*) draw the NPV graph for the projects to determine their IRR, (*c*) show calculations of IRR for each project confirming results in (*b*). Also, state which project would you recommend and why?

12. For Projects *X* and *Y*, the following cash flows are given:

	Cash Flows (Rs)			
Projects	C_0	C_1	C_2	C_3
X	– 750	+ 350	+ 350	+ 159
Y	– 750	+ 250	+ 250	+ 460

(*a*) Calculate the NPV of each project for discount rates 0, 5, 8, 10, 12 and 20 per cent. Plot these on an PV graph.

(*b*) Read the IRR for each project from the graph in (*a*).

(*c*) When and why should Project *X* be accepted?

(*d*) Compute the NPV of the incremental investment ($Y - X$) for discount rates, 0, 5, 8, 10, 12 and 20 per cent. Plot them on graph. Show under what circumstances would you accept *X* ?

NOTES

13. The following are two mutually exclusive projects.

	Cash Flows (Rs)				
Projects	C_0	C_1	C_2	C_3	C_4
I	– 25,000	+ 30,000			
II	– 25,000	0	0	0	43,750

Assume a 10 per cent opportunity cost of capital. Compute the NPV and IRR for each project. Comment on the results.

14. Consider the following projects:

	Cash Flows (Rs)				
Projects	C_0	C_1	C_2	C_3	C_4
A	– 1,000	+ 600	+ 200	+ 200	+ 1,000
B	– 1,000	+ 200	+ 200	+ 600	+ 1,000
C	– 300	+ 100	+ 100	+ 100	+ 600
D	– 300	0	0	+ 300	+ 600

(*a*) Calculate the payback period for each project.

(*b*) If the standard payback period is 2 years, which project will you select? Will your answer be different if the standard payback is 3 years?

(*c*) If the cost of capital is 10 per cent, compute the discounted payback for each project? Which projects will you recommend if the standard payback is (*i*) 2 years; (*ii*) 3 years?

(*d*) Compute the NPV of each project? Which projects will you recommend?

15. A machine will cost Rs 10,000. It is expected to provide profits before depreciation of Rs 3,000 each in years 1 and 2 and Rs 4,000 each in years 3 and 4. Assuming a straight-line depreciation and no taxes, what is the average accounting rate of return? What will be your answer if the tax rate is 35 per cent?

16. A firm has the following information about a project:

	Income Statement (Rs ' 000)		
	C_1	C_2	C_3
Cash revenue	16	14	12
Cash expenses	8	7	6
Gross profit	8	7	6
Depreciation	4	4	4
Net profit	4	3	2

The initial investment of the project is estimated as Rs 12,000.

(*a*) Calculate the project's accounting rate of return.

(*b*) If it is found that the initial investment will be Rs 9,000 and cash expenses will be more by Rs 1,000 each year, what will be the project's accounting rate of return. Also, calculate the project's NPV if the cost of capital is 9 per cent.

17. An investment project has the following cash flows:

Cash Flows (Rs)		
C_0	C_1	C_2
– 150	+ 450	– 300

What are the rates of return of the investment? Assume a discount rate of 10 per cent. Is the investment acceptable?

NOTES

18. A firm is considering the following project:

Cash Flows (Rs)					
C_0	C_1	C_2	C_3	C_4	C_5
– 50,000	+ 11,300	+ 12,769	+ 14,429	+ 16,305	+ 18,421

(*a*) Calculate the NPV for the project if the cost of capital is 10 per cent. What is the project's IRR?

(*b*) Recompute the project's NPV assuming a cost of capital of 10 per cent for C_1 and C_2, of 12 per cent for C_3 and C_4, and 13 per cent for C_5. Should the project be accepted? Can the internal rate of return method be used for accepting or rejecting the project under these conditions of changing cost of capital over time? Why or why not?

19. A finance executive has calculated the profitability index for a new proposal to be 1.12. The proposal's initial cash outlay is Rs 500,000. Find out the proposal's annual cash inflow if it has a life of 5 years and the required rate of return is 8 per cent.

20. Project *P* has the following cash flows:

Cash Flows (Rs)		
C_0	C_1	C_2
– 800	+ 1,200	– 400

Calculate the project's IRRs. If the required rate of return is 25 per cent, would you accept the project. Why?

UNIT 3 LONG-TERM FINANCE: SHARES, DEBENTURES AND TERM LOANS

Structure

3.0 INTRODUCTION

Two long-term securities available to a company for raising capital are—shares and debentures. Shares include ordinary (common) shares and preference shares. Ordinary shares provide ownership rights to investors. Debentures or bonds provide loan capital to the company, and investors get the status of lenders. Loan capital is also directly available from the financial institutions to the companies. What are the characteristics of loan capital and equity capital? What are their merits and demerits? Corporate also raise fixed deposits from the public.

3.1 UNIT OBJECTIVES

- Understand the nature and importance of investment decisions
- Explain the features of ordinary shares
- Focus on the benefits and valuation of rights shares
- Discuss the pros and cons of debentures and preference shares
- Highlights the features of public deposits

NOTES

3.2 ORDINARY SHARES

Ordinary shares (referred to as common shares in USA) represent the ownership position in a company. The holders of ordinary shares, called **shareholders** (or stockholders in USA), are the legal owners of the company. Ordinary shares are the source of permanent capital since they do not have a maturity date. For the capital contributed by shareholders by purchasing ordinary shares, they are entitled for dividends. The amount or rate of dividend is not fixed; the company's board of directors decides it. An ordinary share is, therefore, known as a **variable income security**. Being the owners of the company, shareholders bear the risk of ownership; they are entitled to dividends after the income claims of others have been satisfied. Similarly, when the company is wound up, they can exercise their claims on assets after the claims of other suppliers of capital have been met.

3.2.1 Reporting of Ordinary Shares

The capital represented by ordinary shares is called share capital or equity capital. It appears on the left-hand side of a firm's account-form balance sheet or on the top of sources of capital in the step-form balance sheet. Details about share capital are generally contained in schedules attached to the balance sheet. Table 3.1 shows the details of share capital for the Gujarat Narmada Valley Fertilisers Company Limited (GNFC).

Table 3.1: GNFC's Share Capital as on 31 March, 2003

	(Rs in lakh)
(*a*) Authorised 250,000,000 equity shares of Rs 10 each	25,000.00
(*b*) Issued 148,565,000 equity shares of Rs 10 each	14,865.00
(*c*) Subscribed and paid up 146,476,214 equity shares of Rs 10 each fully paid up	14,647.62
(*d*) Reserves and Surplus	58,377.39
(*e*) Net Worth (*c* + *d*)	73,025.01

Shareholder's equity includes both ordinary shares and preference shares (if any). Therefore, the capital attributable to ordinary shares excludes preference shares capital. In GNFC's case, the ordinary shareholders' equity capital is: Rs 73,025.01 lakh. **Authorised share capital** represents the maximum amount of capital, which a company can raise from shareholders. A company can, however, change its authorised share capital by altering its memorandum of association (a charter of the company). The alteration of memorandum involves somewhat complicated legal procedures. The portion of the authorised share capital, which has been offered to shareholders, is called **issued share capital**. **Subscribed share capital** represents that part of the issued share capital, which has been accepted by shareholders. The amount of subscribed share capital actually paid up by shareholders to the company is called **paid-up share capital**. Often, subscribed and paid-up share capital may be the same.

The total paid-up share capital is equal to the issue price of an ordinary share multiplied by the number of ordinary shares. The *issue price* may include two components: the **par value** and the **share premium**. The par value is the price per ordinary share stated in the memorandum of association. Generally, the par value of a ordinary share is in the denomination of Rs 100 or Rs 10. Any amount in excess of the par value is called the share premium. In the case of new companies the par value and the issue price may be the same. The existing, highly profitable companies may issue ordinary shares at a premium. The paid-up share capital is stated at the par value. The excess amount is separately shown as the share premium. The company's earnings, which have not been distributed to shareholders and have been retained in the business, are called reserves and surplus. They belong to owners—ordinary shareholders. Thus, the total shareholders' equity is the sum of: (*i*) paid-up share capital, (*ii*) share premium, and (*iii*) reserves and surplus. The total shareholders' equity or share capital is also called **net worth**.

The book value per ordinary share is calculated as follows:

$$\text{Book value per share} = \frac{\text{Net worth}}{\text{Number of ordinary shares}} \quad (1)$$

For GNFC, the book value per share as on 31 March 2003 is:

$$= \frac{73{,}025.01}{1{,}464.76} = \text{Rs } 49.85$$

Note that the book value is based on historical figures in the balance sheet. It is in no way related with the **market value** of an ordinary share. The market value of a share is the price at which it trades in the stock market. It is generally based on expectations about the performance of the economy, in general and the company, in particular. GNFC's highest market price per share on Bombay Stock Exchange on 31 March 2003 was Rs 31.10 and lowest Rs 27.40. Thus, GNFC's market price is performing much below the book value. Ordinary shares of all companies may not be traded on stock markets. Therefore, the market value of ordinary shares of all companies may not be available.

3.2.2 Features of Ordinary Shares

Ordinary share has a number of special features which distinguish it from other securities. These features generally relate to the rights and claims of ordinary shareholders.

Claim on income Ordinary shareholders have a **residual ownership** claim. They have a claim to the residual income, which is, earnings available for ordinary shareholders, after paying expenses, interest charges, taxes and preference dividend, if any. This income may be split into two parts: dividends and retained earnings. Dividends are immediate cash flows to shareholders. Retained earnings are reinvested in the business, and shareholders stand to benefit in future in the form of the firm's enhanced value and earnings power and ultimately enhanced dividend and capital gain. Thus, residual income is either directly distributed to shareholders in the form of dividend or indirectly in the form of capital gains on the ordinary shares held by them.

Dividends payable depend on the discretion of the company's board of directors. A company is not under a legal obligation to distribute dividends out of the available earnings. Capital gains depend on future market value of ordinary shares. Thus, an ordinary share is a risky security from the investor's point of view. Dividends paid on ordinary shares are not tax deductible in the hands of the company.

Claim on assets Ordinary shareholders also have a residual claim on the company's assets in the case of liquidation. Liquidation can occur on account of business failure or sale of business. Out of the realised value of assets, first the claims of debt-holders and then preference shareholders are satisfied, and the remaining balance, if any, is paid to ordinary shareholders. In case of liquidation, the claims of ordinary shareholders may generally remain unpaid.

Right to control Control in the context of a company means the power to determine its policies. The board of directors approves the company's major policies and decisions while managers appointed by the board carry out the day-to-day operations. Thus, control may be defined as the power to appoint directors. Ordinary shareholders have the *legal* power to elect directors on the board. If the board fails to protect their interests, they can replace directors. Ordinary shareholders are able to control management of the company through their voting rights and right to maintain proportionate ownership.

Voting rights Ordinary shareholders are required to vote on a number of important matters. The most significant proposals include: election of directors and change in the memorandum of association. For example, if the company wants to change its authorised share capital or objectives of business, it requires ordinary shareholders' approval. Directors are elected at the annual general meeting (AGM) by the majority votes. Each ordinary share carries one vote. Thus, an ordinary shareholder has votes equal to the number of shares held by him. Shareholders may vote in person or by *proxy*. A proxy gives a designated person right to vote on behalf of a shareholder at the company's annual general meeting. When management takeovers are threatened, **proxy fights**—battles between rival groups for proxy votes—occur. An earlier example in this regard was that of Gamon India where both existing management and the Chhabrias fought for the control of the company and put all efforts to collect proxy votes. The existing management could continue its hold on the company with the help of majority shareholders including the financial institutions.

NOTES

Pre-emptive rights The **pre-emptive right** entitles a shareholder to maintain his proportionate share of ownership in the company. The law grants shareholders the right to purchase new shares in the same proportion as their current ownership. Thus, if a shareholder owns 1 per cent of the company's ordinary shares, he has pre-emptive right to buy 1 per cent of new shares issued. A shareholder may decline to exercise this right. The shareholders' option to purchase a stated number of new shares at a specified price during a given period is called **rights**. These rights can be exercised at a subscription price, which is generally much below the share's current market price, or they can be allowed to expire, or they can be sold in the stock market.[1]

Limited liability Ordinary shareholders are the true owners of the company, but their liability is limited to the amount of their investment in shares. If a shareholder has already fully paid the issue price of shares purchased, he has nothing more to contribute in the event of a financial distress or liquidation. This position of shareholders is different from the owners in the case of sole proprietary businesses or partnership firms where they have unlimited liability. In the event of the insolvency of these firms, owners are required to bring in additional capital from their personal savings to pay claims of creditors. The limited liability feature of ordinary share encourages otherwise unwilling investors to invest their funds in the company. Thus, it helps companies to raise funds.

3.2.3 Pros and Cons of Equity Financing

Equity capital is the most important long-term source of financing. It offers the following advantages to the company:

- ***Permanent capital*** Since ordinary shares are not redeemable, the company has no liability for cash outflow associated with its redemption. It is a permanent capital, and is available for use as long as the company goes.
- ***Borrowing base*** The equity capital increases the company's financial base, and thus its borrowing limit. Lenders generally lend in proportion to the company's equity capital. By issuing ordinary shares, the company increases its financial capability. It can borrow when it needs additional funds.
- ***Dividend payment discretion*** A company is not legally obliged to pay dividend. In times of financial difficulties, it can reduce or suspend payment of dividend. Thus, it can avoid cash outflow associated with ordinary shares. In practice, dividend cuts are not very common and frequent. A company tries to pay dividend regularly. It cuts dividend only when it cannot manage cash to pay dividends. For example, in 1986 the Reliance Industries Limited experienced a sharp drop in its profits and had a severe liquidity problem; as a consequence, it had to cut its dividend rate from 50 per cent to 25 per cent. The company, however, increased the dividend rate next year when its performance improved.

Equity capital has some disadvantages to the firm compared to other sources of finance. They are as follows:

- ***Cost*** Shares have a higher cost at least for two reasons: Dividends are not tax deductible as are interest payments, and flotation costs on ordinary shares are higher than those on debt.
- ***Risk*** Ordinary shares are riskier from investors' point of view as there is uncertainty regarding dividend and capital gains. Therefore, they require a relatively higher rate of return. This makes equity capital as the highest cost source of finance.
- ***Earnings dilution*** The issue of new ordinary shares dilutes the existing shareholders' earnings per share if the profits do not increase immediately in proportion to the increase in the number of ordinary shares.
- ***Ownership dilution*** The issuance of new ordinary shares may dilute the ownership and control of the existing shareholders. While the shareholders have a pre-emptive right to retain their proportionate ownership, they may not have funds to invest in additional shares. Dilution of ownership assumes great significance in the case of closely held companies. The issuance of ordinary shares can change the ownership.

1. Gupta, L.C., *Rates of Return on Equities: The Indian Experience,* Oxford University Press, 1981, pp. 9–11.

3.2.4 Public Issue of Equity

Public issue of equity means raising of share capital directly from the public. For example, Riga Sugar Company Limited (RSIL), a subsidiary of Belsund Sugar Limited made a public issue of equity shares of Rs 10 crore on 12 July 1994. The issue price per share is Rs 50—representing a premium of Rs 40 over its par value. The issue price is also higher than its book value of Rs 26.35 per share. The company needs funds for expansion and modernisation of its plant as well as for diversification into the manufacture of ethyl alcohol. The company expects to pay a dividend of 20 per cent in 1993–94 and 1994–95 and 25 per cent in 1995–96.

Consider another case, N.R. Agarwal Industries Limited is approaching the public for the first time to raise Rs 3.20 crore on 7 July 1994. Incorporated as a public limited company in December 1993, the maiden issue of equity shares is intended to part-finance its project for manufacturing industrial paper in Vapi, Gujarat. The share is issued at par at Rs 10.

As per the existing norms, a company with a track record is free to determine the issue price for its shares. Thus, it can issue shares at a premium. However, a new company has to issue its shares at par.

Underwriting of issues It is legally obligatory to underwrite a public and a rights issue. In an underwriting, the underwriters—generally banks, financial institution, brokers etc.—guarantee to buy the shares if the issue is not fully subscribed by the public. The agreement may provide for a firm buying by the underwriters. The company has to pay an underwriting commission to the underwriter for their services.

3.2.5 Private Placement

Private placement involves sale of shares (or other securities) by a company to few selected investors, particularly the institutional investors like the Unit Trust of India (UTI), the Life Insurance Corporation of India (LIC), the Industrial Development Bank of India (IDBI), etc. Private placement has the following advantages:

- ***Size*** It is helpful to issue small amount of funds.
- ***Cost*** It is less expensive. In the case of public issue of securities, the issue costs, including both statutory and other costs, are quite high, ranging between 10 to 20 per cent of the size of issue. A substantial part of these costs can be avoided through private placement.
- ***Speed*** It takes less time to raise funds through private placement, say, less than 3 months. Public issues involve a number of requirements to be fulfilled, and this requires a lot of time to raise capital.

3.3 RIGHTS ISSUE OF EQUITY SHARES

A **rights issue** involves selling of ordinary shares to the existing shareholders of the company. The law in India requires that the new ordinary shares must be first issued to the existing shareholders on a *pro rata* basis. Shareholders through a special resolution can forfeit this pre-emptive right. Obviously, this will dilute their ownership.

3.3.1 Terms and Procedures

A company can make rights offering to its shareholders after meeting the requirements specified by the Securities and Exchange Board of India (SEBI). Those shareholders who renounce their rights are not entitled for additional shares. Shares becoming available on account of non-exercise of rights are allotted to shareholders who have applied for additional shares on *pro rata* basis. Any balance of shares left after issuing the additional shares can be sold in the open market.

Let us assume that a company announces on 2nd January 2004 that all shareholders whose names are in the register of members as on 25th February 2004 will be issued rights, which will

Check Your Progress

1. Name three distinguishing features of ordinary shares.
2. Distinguish between authorized and issued share capital.
3. Distinguish between par value and share premium in the case of an ordinary share.
4. Which are the three components of net worth of a company?
5. What are the main rights of an ordinary shareholder?
6. What are the pros and cons of equity financing?
7. Distinguish between public issue and private placement of equity.

NOTES

expire on 10th March 2004. The company will mail the "letter of rights" on 5th April 2004. In the example, 2nd January 2004 is the announcement date, 25th February 2004 is the *holder-of-the-register-of-members date*, 5th April 2004 is the *offer-of-rights date* and 10th March 2004 is the *expiration-of-rights date*. It may be possible that the share may be traded (bought and sold) a few days before the holder-of-the-register-of-members date (5th April 2004 in the example), and it may not be transferred and registered in the new name. The rights might then be wrongly sent to the old shareholder. If the share is traded within the *ex-rights date*, it will be duly registered in the name of purchaser. The ex-rights date occurs a few days prior to the holder-of-the-register-of-member date. This implies that after the ex-rights date the share sells without the rights. The price of the share before the ex-rights date is called as **right-on** or **cum-rights** while the price after this date is referred to as the **ex-rights** price.

In India along with the letter of rights, four forms may be sent. Form A is intended for accepting the rights and applying for additional shares. Form B is meant for the purpose of foregoing the rights in favour of other person. Form C has to be used by the person in whose favour the rights have been renounced for making application. Form D is for the purpose of requesting for the split forms.

When the rights are offered for raising funds, three issues are involved: (*i*) the number of rights needed to buy a new share, (*ii*) the theoretical value of a right, and (*iii*) the effect of rights offerings on the value of the ordinary shares outstanding. We shall consider an example to discuss these issues.

The Sunshine Industries Limited has 900,000 shares outstanding at current market price of Rs 130 per share. The company needs Rs 22.50 million (or Rs 2.25 crore) to finance its proposed modernisation-cum-expansion project. The board of the company has decided to issue rights for raising the required money. The subscription (issue) price (P_s) has been fixed at Rs 75 per share. The subscription price has been set below the market price to ensure that the rights issue is fully subscribed. How many rights required purchasing a new share? What is the value of a right?

3.3.2 Value of a Right

We can first determine the number of new shares to be issued to raise Rs 22.50 million at Rs 75 per share:

$$\text{No. of new shares}(s) = \frac{\text{Desired funds}}{\text{Subscription price } (P_s)}$$

$$= \frac{22,500,000}{75} = 300,000 \text{ shares} \qquad (2)$$

We know that each ordinary share will get one right; therefore, there are a total number of 900,00 rights. The company wants to sell 300,000 new shares. The number of rights required to buy on new share will be equal to the number of existing shares outstanding (S_o) divided by new share(s) to be sold:

$$\text{No. of rights} = \frac{\text{Existing shares}}{\text{New shares}}$$

$$N = \frac{S_o}{s} \qquad (3)$$

In our example, the number of rights required are:

$$= \frac{900,000}{300,000} = 3 \text{rights}$$

This implies that to purchase a new share, an existing shareholder should have 3 rights and Rs 75. What is the price of one share after rights offering? The price of the share after the rights issue is called *ex-rights price* (P_x). It is equal to the value of 3 rights plus Rs 75.

Price of a share after rights issue (P_x) = Value of 3 rights + Rs 75

The formula for the ex-rights issue (P_x) can be written as follows:

$$P_x = N \times R + P_s \tag{4}$$

NOTES

where N is the number of rights needed to buy one share, R is the value of a right and P_s is the subscription price. In fact, this price can be found out directly. The price of a share after rights issue is equal to the sum of value of existing shares (900,000) at the current market-price (Rs 130) and the value of new shares (300,000) at subscription price (Rs 75) divided by total number of shares after the rights issue (900,000 + 300,000 = 1,200,000):

Price of share after rights issue
= (Existing shares × Current market price + New shares × Subscription price) ÷ (Existing shares + New shares)

$$P_x = \frac{S_o \times P_o + s \times P_s}{S_o + s} = \frac{S_o P_o + sP_s}{S} \tag{5}$$

where $S = S_o + s$. In the example, the price is:

$$= \frac{900{,}000 \times 130 + 300{,}000 \times 75}{900{,}000 + 300{,}000} = \frac{1{,}170{,}000 + 22{,}500{,}000}{1{,}200{,}000}$$

$$= \text{Rs}\,116.25$$

In the case of the Sunshine rights issue, we know that a shareholder can buy one new share for Rs 75 plus 3 rights. The company's share after the ex-rights date is theoretically worth Rs 116.25. Therefore, the total value of 3 rights together is Rs 41.25. (Rs 116.25 – Rs 75), and the value of each right is Rs 13.75 (Rs 41.25/3). Thus the share price on the ex-right date drops by Rs 13.75 from the cum-rights (rights-on) price of Rs 130 to the ex-rights price of Rs 116.25. This drop is the value of one right. In fact, what has happened is that the cum-rights (rights-on) price (P_o = Rs 130) has divided into the ex-rights price (P_x = Rs 116.25) and the value of a right (R = Rs 13.75). Thus, $P_o = P_x + R$.

We can also use other formulae to determine the value of a right. We can combine Equations (4) and (5) to find out value of a right as follows:

$$\begin{aligned} P_x = \frac{S_o P_o + sP_s}{S} &= NR + P_s \\ NR &= P_x - P_s \\ R &= \frac{P_x - P_s}{N} \end{aligned} \tag{6}$$

where R is the value of a right, P_x is the ex-rights price which is given by Equation (4) and P_s is the subscription price. Applying Equation (6) to our example, R is equal to:

$$R = \frac{116.25 - 75}{3} = \frac{41.25}{3} = \text{Rs}\,13.75$$

Notice that Equation (6) gives the value of a right when the share is selling ex-rights. What is the value of a right when the share is selling cum-rights (rights-on)? We know that the cum-rights price (P_o) is:

$$P_o = P_x + R \tag{7}$$

and the ex-rights price (P_x) is:

$$P_x = P_o - R \tag{8}$$

The price of a right when share is selling ex-rights is:

$$R = \frac{P_x - P_s}{N} \tag{9}$$

NOTES

Substituting $P_o - R$ for P_x from Equation (8) into Equation (6), we obtain:

$$R = \frac{P_o - R - P_s}{N}$$
$$NR = P_o - R - P_s$$
$$NR + R = P_o - P_s$$
$$R(N+1) = P_o - P_s$$
$$R = \frac{P_o - P_s}{N+1}$$

For the Sunshine Limited the value of a right is:

$$R = \frac{130 - 75}{3+1} = \frac{55}{4} = \text{Rs}\,13.75$$

This is the same value as found by Equation (6) under the assumption that the share was selling ex-rights.

3.3.3 Effect on Shareholders' Wealth

From the calculations of the value of a right when the share is selling ex-rights, or cum-rights, it should be clear that the existing shareholder does not benefit or lose from rights issue. What he receives in the form of the value of a right, he loses in the form of decline in share price. His wealth remains unaffected when he exercises his rights. Of course, he will lose if he does not exercise his rights or sells them. Thus, the shareholder has three options: (1) he exercises his rights, (2) he sells his rights, or (3) he does not exercise or sell his rights. He will lose under the third option. Let us illustrate.[2]

Suppose a shareholder in Sunshine owns 3 shares. At a current market price of Rs 130, his total wealth is Rs 390. Let us assume that he exercises his rights as offered by the company. After the exercise of his rights, he will own 4 shares at the ex-rights price of Rs 116.25. Therefore, his total wealth is: Rs 116.25 × 4 = Rs 465. But he has spent Rs 75 to obtain the additional share. So his net wealth is: Rs 465 – Rs 75 = Rs 390—same as before the rights issue. Now assume that he does not exercise his rights rather sells them at Rs 13.75 per right. He still own 3 shares but at a price of Rs 116.25 per share (ex-rights price). So his total value of shares is: Rs 116.25 × 3 = Rs 348.75. But he also obtains: Rs 13.75 × 3 = Rs 41.25 by selling his rights. Therefore, his net wealth is: Rs 348.75 + Rs 41.25 = Rs 390—once again same as before the rights issue. Let us now assume that he does nothing. This means that he would simply own 3 shares at a price of Rs 116.25 after the expiry of rights issue. Thus his wealth would decline to Rs 348.75 from Rs 390.

3.3.4 Is Subscription Price of Any Significance?

Is the subscription price (P_s) significant? It is irrelevant in terms of the impact on the shareholders' wealth. It can be fixed at any level below the current market price. What the shareholder gains in terms of the value of rights, he will lose in terms of decline in the share price. The primary objective in setting the subscription price low is that after the rights offering the market price should not fall below it.

Will the theoretical value of a right always equal its actual market value? The theoretical value could differ from the actual value for three reasons.[3] *First*, the high transaction costs can limit the investor arbitrage that would otherwise push the market price of the right to its theoretical value. *Second*, speculation over the subscription period can push the market price above or below the theoretical value. *Third*, large flotation costs can also affect these two values.

2. Gupta, *ibid*.
3. For a simple treatment of the issues refer to Keown, A.J., *et. al*., *Basic Financial Management*, Prentice-Hall, 1985, p. 649.

3.3.5 Pros and Cons of Rights Issue

There are three main advantages of the rights issue. *First*, the existing shareholders' control is maintained through the *pro rata* issue of shares. This is significant in the case of closely held company or when a company is going into financial difficulties or is under a takeover threat. *Second*, raising funds through the sale of rights issue rather than the public issue involves less flotation costs as the company can avoid underwriting commission. *Third*, in the case of profitable companies, the issue is more likely to be successful since the subscription price is set much below the current market price.

The main disadvantage is to the shareholders who fail to exercise their rights. They lose in terms of decline in their wealth. Yet another disadvantage is for those companies whose shareholding is concentrated in the hands of financial institutions because of the conversion of loan into equity. They would prefer public issue of shares rather than the rights issue.

3.4 PREFERENCE SHARES

Preference share is often considered to be a **hybrid security** since it has many features of both ordinary shares and debenture. It is similar to ordinary share in that (*a*) the non-payment of dividends does not force the company to insolvency, (*b*) dividends are not deductible for tax purposes, and (*c*) in some cases, it has no fixed maturity date. On the other hand, it is similar to debenture in that (*a*) dividend rate is fixed, (*b*) preference shareholders do not share in the residual earnings, (*c*) preference shareholders have claims on income and assets prior to ordinary shareholders, and (*d*) they usually do not have voting rights.

3.4.1 Features

Preference share has several features. Some of them are common to all types of preference shares while others are specific to some.[4]

Claims on income and assets Preference share is a **senior security** as compared to ordinary share. It has a prior claim on the company's income in the sense that the company must first pay preference dividend before paying ordinary dividend. It also has a prior claim on the company's assets in the event of liquidation. The preference share claim is honoured after that of a debenture and before that of ordinary share. Thus, in terms of risk, preference share is less risky than ordinary share. There is a cost involved for the relative safety of preference investment. Preference shareholders generally do not have voting rights and they cannot participate in extraordinary profits earned by the company. However, a company can issue preference share with voting rights (called **participative preference shares**).

Fixed dividend The dividend rate is fixed in the case of preference share, and preference dividends are not tax deductible. The preference dividend rate is expressed as a percentage of the par value. The amount of preference dividend will thus be equal to the dividend rate multiplied by the par value. Preference share is called **fixed-income security** because it provides a constant income to investors. The payment of preference dividend is not a legal obligation. Usually, a profitable company will honour its commitment of paying preference dividend.

Cumulative dividends Most preference shares in India carry a cumulative dividend feature, requiring that all past unpaid preference dividend be paid before any ordinary dividends are paid. This feature is a protective device for preference shareholders. The preference dividends could be omitted or passed without the cumulative feature. Preference shareholders do not have power to force company to pay dividends; non-payment of preference dividend also does not result into insolvency. Since preference share does not have the dividend enforcement power, the cumulative feature is necessary to protect the rights of preference shareholders.

Redemption Theoretically both redeemable and perpetual (irredeemable) preference shares can be issued.[5] Perpetual or irredeemable preference share does not have a maturity date. Redeemable

Check Your Progress

8. What is the basic principle of a rights issue?
9. What are the pros and cons of a Rights Issue?

4. See Keown *et. al. ibid*., p. 637–38.
5. In India, companies cannot issue irredeemable preference shares.

NOTES

preference share has a specified maturity. In practice, redeemable preference shares in India are not often retired in accordance with the stipulation since there are not serious penalties for violation of redemption feature.

Sinking fund Like in the case of debenture, a sinking fund provision may be created to redeem preference share. The money set aside for this purpose may be used either to purchase preference share in the open market or to buy back (call) the preference share. Sinking funds for preference shares are not common.

Call feature The call feature permits the company to buy back preference shares at a stipulated **buy-back** or **call price**. Call price may be higher than the par value. Usually, it decreases with the passage of time. The difference between call price and par value of the preference share is called *call premium.*

Participation feature Preference shares may in some cases have participation feature which entitles preference shareholders to participate in extraordinary profit earned by the company. This means that a preference shareholder may get dividend amount in excess of the fixed dividend. The formula for determining extra dividend would differ. A company may provide for extra dividend to preference shareholders equal to the amount of ordinary dividend that is in excess of the regular preference dividend. Thus if the preference dividend rate is 10 per cent and the company pays an ordinary dividend of 16 per cent, then preference shareholders will receive extra dividend at 6 per cent (16 per cent–10 per cent). Preference shareholders may also be entitled to participate in the residual assets in the event of liquidation.

Voting rights Preference shareholders ordinarily do not have any voting rights. They may be entitled to **contingent** or **conditional voting rights**. In India, if a preference dividend is outstanding for two or more years in the case of cumulative preference shares, or the preference dividend is outstanding for two or more consecutive preceding years or for a period of three or more years in the preceding six years, preference shareholders can nominate a member on the board of the company.

Convertibility Preference shares may be convertible or non-convertible. A convertible preference share allows preference shareholders to convert their preference shares, fully or partly, into ordinary shares at a specified price during a given period of time. Preference shares, particularly when the preference dividend rate is low, may sometimes be converted into debentures. For example, the Andhra Cement converted its preference shares of Re 0.33 crore into debentures in 1985. To make preference share attractive, the government of India has introduced **convertible cumulative preference share** (CCPS). Unfortunately, companies in India have hardly used this security to raise funds.

3.4.2 Pros and Cons

Preference share has a number of advantages to the company, which ultimately occur to ordinary shareholders.[6]

- ***Riskless leverage advantage*** Preference share provides financial leverage advantages since preference dividend is a fixed obligation. This advantage occurs without a serious risk of default. The non-payment of preference dividends does not force the company into insolvency.
- ***Dividend postponability*** Preference share provides some financial flexibility to the company since it can postpone payment of dividend.
- ***Fixed dividend*** The preference dividend payments are restricted to the stated amount. Thus preference shareholders do not participate in excess profits as do the ordinary shareholders.
- ***Limited voting rights*** Preference shareholders do not have voting rights except in case dividend arrears exist. Thus the control of ordinary shareholders is preserved.

The following are the limitations of preference shares:

- ***Non-deductibility of dividends*** The primary disadvantage of preference share is that preference dividend is not tax deductible. Thus it is costlier than debenture.

6. For a detailed discussion of the characteristics, merits and demerits of preference shares in India, see Gupta, L.C., *Preference Shares and Company Finance*, IFMR, 1975. Also refer to Keown, *op. cit.*, pp. 638–43.

- ***Commitment to pay dividend*** Although preference dividend can be omitted, they may have to be paid because of their cumulative nature. Non-payment of preference dividends can adversely affect the image of a company, since equity holders cannot be paid any dividends unless preference shareholders are paid dividends.

Preference shares provide more flexibility and lesser burden to a company. The dividend rate is less than on equity and it is fixed. Also, the company can redeem it when it does not require the capital. In practice, when a company reorganises its capital, it may convert preference capital into equity. Some time equity may be converted into preference capital. For example, IDBI in 1994 proposed to convert its equity capital as preference capital.

NOTES

3.5 DEBENTURES

A **debenture** is a long-term promissory note for raising loan capital. The firm promises to pay interest and principal as stipulated. The purchasers of debentures are called debenture holders. An alternative form of debenture in India is **bond**. Mostly public sector companies in India issue bonds. In USA, the term debenture is generally understood to mean unsecured bond.

3.5.1 Features

A debenture is a long-term, fixed-income, financial security. Debenture holders are the creditors of the firm. The *par value* of a debenture is the face value appearing on the debenture certificate. Corporate debentures in India are issued in different denominations. The large public sector companies issue bonds in the denominations of Rs 1,000. Some of the important features of debentures are discussed below.

Interest rate The interest rate on a debenture is fixed and known. It is called the **contractual rate of interest**. It indicates the percentage of the par value of the debenture that will be paid out annually (or semi-annually or quarterly) in the form of interest. Thus, regardless of what happens to the market price of a debenture, say, with a 15 per cent interest rate, and a Rs 1,000 par value, it will pay out Rs 150 annually in interest until maturity. Payment of interest is legally binding on a company. Debenture interest is tax deductible for computing the company's corporate tax. However, it is taxable in the hands of a debenture holder as per the income tax rules. However, public sector companies in India are sometimes allowed by the government to issue bonds with tax-free interest. That is, the bondholder is not required to pay tax on his bond interest income.

Maturity Debentures are issued for a specific period of time. The *maturity* of a debenture indicates the length of time until the company redeems (returns) the par value to debenture-holders and terminates the debentures. In India, a debenture is typically redeemed after 7 to 10 years in instalments.

Redemption As indicated earlier, debentures are mostly redeemable; they are generally redeemed on maturity. Redemption of debentures can be accomplished either through a **sinking fund** or **buy-back (call) provision**.

Sinking fund A sinking fund is cash set aside periodically for retiring debentures. The fund is under the control of the trustee who redeems the debentures either by purchasing them in the market or calling them in an acceptable manner. In some cases, the company itself may handle the retirement of debentures using the sinking funds. The advantage is that the periodic retirement of debt through the sinking funds reduces the amount required to redeem the remaining debt at maturity. Particularly when the firm faces temporary financial difficulty at the time of debt maturity, the repayment of huge amount of principal could endanger the firm's financial viability. The use of the sinking fund eliminates this potential danger.

Buy-back (call) provision Debenture issues include buy-back provision. Buy-back provisions enable the company to redeem debentures at a specified price before the maturity date. The **buy-back (call) price** may be more than the par value of the debenture. This difference is called *call or buy-back premium*. In India, it is generally 5 per cent of the par value.

Check Your Progress

10. Why is a preference share sometimes known as a hybrid security?

NOTES

EXHIBIT 3.1: CREDIT RATING OF DEBENTURES IN INDIA

CRISIL provides the following ratings to bonds/debentures.

- ***AAA (highest safety)*** Triple A (AAA) rated debentures imply highest safety in the timely payment of interest and principal even if changes take place in the circumstances subsequently.
- ***AA (high safety)*** Double A (AA) rated debentures ensure high safety—marginally less than the safety provided by triple A debentures.
- ***A (adequate safety)*** Single A rated debentures provide for timely payment of interest and principal, but the changed circumstances in future may affect such debentures as compared to the higher rated debentures.
- ***BBB (low safety)*** Triple B (BBB) debentures ensure sufficient safety with regard to the payment of interest and principal. But the changed circumstances later on are more likely to weaken the capacity of the issuing company to pay interest and principal.
- ***BB (inadequate safety)*** Double B (BB) rated debentures do not provide adequate safety of timely payment of interest and principal. The uncertainties of future can lead to inadequate capacity to make timely payment of interest and principal.
- ***B (high risk)*** Single B rated debentures are likely to default. Adverse circumstances can render the ability or willingness of a borrower quite weak to pay interest or principal.
- ***C (substantial risk)*** C rated debentures have current factors that make them vulnerable to default. For no default of payment of interest or principal, favourable circumstances must continue.
- ***D (in default)*** D rated debentures are in default or are expected to be in default.

Source: Information published by CRISIL.

Indenture An **indenture** or **debenture trust deed** is a legal agreement between the company issuing debentures and the debenture trustee who represents the debenture holders. It is the responsibility of the trustee to protect the interests of debenture holders by ensuring that the company fulfils the contractual obligations. Generally, a financial institution, or a bank, or an insurance company or a firm of attorneys is appointed as a trustee. The debenture trust deed (indenture) provides the specific terms of the agreement, including a description of debentures, rights of debenture holders, rights of the issuing company and responsibilities of trustee.

Security Debentures are either *secured* or *unsecured*. A secured debenture is secured by a lien on the company's specific assets. If the company defaults, the trustee can seize the security on behalf of the debenture holders. In India, debentures are usually secured by a charge on the present and future immovable assets of the company. This is called **equitable mortgage**. When debentures are not protected by any security, they are known as unsecured or naked debentures. As stated earlier, in USA the term debenture always means unsecured bond while bond could be secured or unsecured. If the debentures are unsecured, it will generally be difficult for the firm to attract investors to subscribe to them. Security, however, does not necessarily ensure the safety of a debenture/bond from the investor's point of view. Professional bodies rate bonds/debentures to indicate the degree of their safety. Credit rating of a bond/debenture shows the chances of timely payment of interest and principal by a borrower.

In India, the Credit Rating and Information Services of India Limited (CRISIL) provides rating for bonds/debentures, fixed deposits and commercial papers. Other rating companies include CARE and ICRA. Exhibit 20.1 explains the nature of debenture ratings given by CRISIL.

Yield The **yield** on a debenture is related to its market price; therefore, it could be different from the coupon rate of interest. Two types of yield could be distinguished. The **current yield** on a debenture is the ratio of the annual interest payment to the debenture's market price. For example, the current yield of a 14 per cent Rs 1,000 debenture currently selling at Rs 750 is:

$$\text{Current yield} = \frac{\text{Annual interest}}{\text{Market price}} = \frac{140}{750}$$

$$= 0.187 \text{ or } 18.7\%$$

The **yield to maturity** takes into account the payments of interest and principal over the life of the debenture. Thus, it is the internal rate of return of the debenture. Mathematically, the yield to maturity is the discount rate that equates the present value of the interest and principal payments with the current market price of the debentures.

Claims on assets and income Debenture holders have a claim on the company's earnings prior to that of the shareholders. Debentures interest has to be paid before paying any dividends to preference and ordinary shareholders. A company can be forced into bankruptcy if it fails to pay interest to debenture holders. Therefore, in practice, the debenture holders' claim on income is generally honoured except in the case of extreme financial difficulties faced by the company.

In liquidation, the debenture holders have a claim on assets prior to that of shareholders. However, secured debenture holders will have priority over the unsecured debenture holders. Thus, different types of debt may have a hierarchy among themselves as their order of claim on the company's assets.

3.5.2 Types of Debentures

Debentures may be straight debentures or convertible debentures. A convertible debenture (CD) is one which can be converted, fully or partly, into shares after a specified period of time. Thus on the basis of convertibility, debentures may be classified into three categories.

- Non-convertible debentures (NCDs)
- Fully convertible debentures (FCDs)
- Partly convertible debentures (PCDs).

Non-convertible debentures (***NCDs***) NCDs are pure debentures without a feature of conversion. They are repayable on maturity. The investor is entitled for interest and repayment of principal. The erstwhile Industrial Credit and Investment Corporation of India (ICICI) issued debentures for Rs 200 crores fully non-convertible bonds of Rs 1,000 each at 16 per cent rate of interest, payable half-yearly. The maturity period was five years. However, the investors had the option to be repaid fully or partly the principal after 3 years after giving due notice to ICICI.

Companies in practice also issue **zero-interest debentures** (ZID). These debentures are issued at a highly discounted issue price. The difference between the issue price and the maturity value is the implicit amount of interest. Zero-interest debentures are also called **deep-discount debentures** (bonds).

Fully-convertible debentures (***FCDs***) FCDs are converted into shares as per the terms of the issue with regard to price and time of conversion. The pure FCDs carry interest rates, generally less than the interest rates on NCDs since they have the attraction feature of being converted into equity shares. Recently, companies in India are issuing FCDs with zero rate of interest. For example, Jindal Iron and Steel Company Limited raised Rs 111.2 each. After 12 months of allotment, each FCD was convertible into one share of Rs 100–Rs 90 being the premium.

Partly-convertible debentures (***PCDs***) A number of debentures issued by companies in India have two parts: a convertible part and a non-convertible part. Such debentures are known as partly-convertible debentures (PCDs). The investor has the advantages of both convertible and non-convertible debentures blended into one debenture. For example, Proctor and Gamble Limited (P&G) issued 400,960 PCDs of Rs 200 each to its existing shareholders in July 1991. Each PCD has two parts: convertible portion of Rs 65 each to be converted into one equity share of Rs 10 each at a premium of Rs 55 per share at the end of 18 months from the date of allotment and non-convertible portion of Rs 135 payable in three equal instalments on the expiry of 6th, 7th and 8th years from the date of allotment.

3.5.3 Pros and Cons

Debenture has a number of advantages as long-term source of finance:

- ***Less costly*** It involves less cost to the firm than the equity financing because (*a*) investors consider debentures as a relatively less risky investment alternative and therefore, require a lower rate of return and (*b*) interest payments are tax deductible.

NOTES

- ***No ownership dilution*** Debenture-holders do not have voting rights; therefore, debenture issue does not cause dilution of ownership.
- ***Fixed payment of interest*** Debenture holders do not participate in extraordinary earnings of the company. Thus the payments are limited to interest.
- ***Reduced real obligation*** During periods of high inflation, debenture issue benefits the company. Its obligation of paying interest and principal which are fixed decline in real terms.

Debenture has some limitations also:

- ***Obligatory payments*** Debenture results in legal obligation of paying interest and principal, which, if not paid, can force the company into liquidation.
- ***Financial risk*** It increases the firm's financial leverage, which may be particularly disadvantageous to those firms which have fluctuating sales and earnings.
- ***Cash outflows*** Debentures must be paid on maturity, and therefore, at some points, it involves substantial cash outflows.
- ***Restricted covenants*** Debenture indenture may contain restrictive covenants which may limit the company's operating flexibility in future.

3.6 FIXED DEPOSITS FROM PUBLIC

There are several modes through which a company can borrow funds for its short term working capital requirements. This includes borrowings from banks, corporate bodies, individuals, etc. These borrowings may either be secured or unsecured. A company may also obtain fixed deposits from public/shareholders to meet its short-term fund requirements subject to certain provisions under the Companies Act, 1956 (the Act)

Pursuant to the provisions of the Act (Section 58A), the company can invite deposit subject to the following conditions

- It is in accordance with the prescribed rules.
- An advertisement is issued showing the financial position of the company and
- The company is not in default in the repayment of any deposit or interest.

3.6.1 Guidelines

In case of non banking and non financial companies, the Central Government has issued 'Companies (Acceptance of Deposits) Rules, 1975' and in case of non banking financial companies, the Reserve Bank of India has issued 'Non Banking Financial Companies Acceptance of Public Deposits (Reserve Bank) Directions, 1998' which have to be complied with along with the provisions of Section 58A of the Act.

3.6.2 Reasons for Fixed Deposits

For its short term requirements, a company may prefer to accept fixed deposits instead of taking loans from banks depending on the rates of interest being charged. Normally, listed companies come out with the schemes of 'fixed deposits' as they are better known. Response to such listed companies from public is better as compared to unlisted companies.

A non-banking and non-financial company can borrow deposits up to the extent given below:

(i) Up to 25% of the paid-up capital and free reserves of the company from the public and

(ii) Up to 10% of its paid-up capital and free reserves from its shareholders.

Therefore, maximum deposit a company can accept from public/shareholders is 35% of its paid up capital and free reserves as mentioned above.

If the company is a Government Company, then it can accept or renew deposits from public upto 35% of its paid up capital and free reserves.

Check Your Progress

11. What are the major types of debentures?
12. List briefly the pros and cons of non-convertible debentures as a long-term source of finance.

3.6.3 Period of Fixed Deposits

As per the existing rules the period of fixed deposits is from 6 months to 36 months from the date of acceptance of such deposits or from the date of its renewal. However, a company may accept deposits up to 10% of its paid up capital and free reserves which are repayable after three months, from the date of such deposits or renewal thereof to meet any of its short term requirements.

3.6.4 Rate of interest

Maximum rate of interest that a company can offer on fixed deposits is fixed from time to time.

3.6.5 Statement of Advertisement

Before accepting deposits, it is mandatory for such companies to issue an advertisement in a leading English newspaper and also in a vernacular newspaper circulating in the State in which the registered office of the company is situated. Such advertisement should be approved by the Board of Directors of the Company at its meeting duly signed by majority of the Directors.

Contents of Advertisement: The advertisement must contain the following details:

(i) Name of the company;

(ii) Date of incorporation;

(iii) Business carried on by the company and its subsidiaries with details of branches or units, if any;

(iv) Brief particulars of the management of the company;

(v) Names, address and occupation of Directors;

(vi) Profits before tax and after tax for three financial years preceding the date of the advertisement;

(vii) Dividends declared for the last three years;

The advertisement should provide the summarised financial position of the company from the audited annual accounts for two years preceding the date of the advertisement.

3.6.6 Maintenance of Liquid Assets

It is mandatory for a company to deposit certain amount from deposits received with banks or deal with then in such a manner so as to enable it to make repayment of the deposits on the due date.The minimum amount to be deposited in liquid assets as mentioned above is 15% of the amount of deposits maturing upto 31st March of the following year. The amount so deposited as above cannot be utilised for any purpose other than the repayment of deposits maturing during the year upto 31st March of the following year.

3.6.7 Annual Return

Companies accepting deposits are required to file an annual return in the prescribed format with the Registrar of Companies on or before 30th June of every year for the year ended 31st March of that year. This annual return must be certified by the auditors of the company.

3.6.8 Repayment of Deposits before Maturity

A company, in response to a request from the depositor may make repayment of a deposit after the expiry of six months from the date of receipt but before the expiry of the period for which the deposit was accepted. Under such circumstances, the company shall pay rate of interest on the deposit at a rate lower than 1% from the rate applicable for the period for which the deposit was made.

NOTES

3.6.9 Deduction of Tax

The company has to deduct income-tax at source on the interest paid to the depositors as per the rate applicable under the Income-tax Act, 1961. Presently, no tax is to be deducted from the interest payable upto Rs. 5,000.

3.6.10 Failure to Repay Deposits on Maturity

If a company fails to repay deposit on maturity, the Company Law Board (CLB) has the power to consider the matter either on its own motion or on the application of a depositor and can order the company to make repayment of the deposit in such a manner as the CLB may deem fit.

3.6.11 Non-banking Financial Companies (NBFCs)

The RBI regulates NBFCs engaged in equipment leasing, hire purchase finance, loan and investment, residuary non-banking companies (RNBCs) and the deposit taking activity of miscellaneous non-banking companies (chit funds). With the amendment of the RBI Act in 1997, it is obligatory for NBFCs to apply for a certificate of registration (COR).

As per extant guidelines, NBFCs that were granted certificate of registration (COR) in the non-public deposit-taking category should meet the minimum capital requirement of Rs 2 crore for being eligible to apply to the RBI for accepting deposits. By the end of March 2005, the RBI had received 38,096 applications for grant of COR. Of these, the RBI has approved 13,187 applications (net of cancellation), including 474 applications (net of cancellation) of companies authorised to accept/hold public deposits. By end-June 2005, the total number of NBFCs increased to 13,261 (net of cancellation), of which 507 were public-deposit accepting companies. In recent years, a declining trend has been observed in the number of operating NBFCs owing to strict application of registration norms.

The number of Residuary Non-banking Companies (RNBCs), which were five at end-March 2003, declined to three at end-March 2004 and remained unchanged at that level at end-March 2005.

Deposits of reporting NBFCs constituted 1.1 per cent of aggregate deposits of scheduled commercial banks at end-March 2005 as against 1.2 per cent at end-March 2004 and 1.5 per cent at end-March 2003. The deposits of NBFCs have been stagnant at around Rs.20,000 crores for the last three years.

The maximum rate of interest that the NBFCs including nidhi and chit fund companies can pay is at present 11.0 per cent per annum (effective March 4,2003). The minimum rate of interest payable by RNBCs also remained unchanged at 5 per cent per annum (to be compounded annually) on the amount of deposits received in lump sum or at monthly or longer intervals and at 3.5 per cent per annum (to be compounded annually) on the amount deposited under daily deposit scheme.

3.8 FACTORS AFFECTING LONG TERM FUNDS

The financial system in an economy is a complex system consisting of financial markets, financial intermediaries and financial instruments. A key task of the financial system is to transform savings into investments. An efficient financial system allocates resources as per requirements of companies, firms and individuals.

Long term funds are usually required for long term investments. Long term physical investments made by individuals include housing and consumer durables. On the other hand, firms and companies require long term funds for long term projects including plant and machinery, buildings, infrastructure investments, etc. Governments also raise long term funds by issuing dated securities.

In a well developed and efficient financial system, a variety of financial instruments are made available by economic agents. These instruments enable market players to pool resources as well as arrive at a fair price for the funds raised. A well developed financial market also enables risk pooling and risk sharing among market players.

Check Your Progress

13. What is the main reason for corporates to raise funds in the form of public deposits?
14. Who are the main regulators in the case of public deposits?

NOTES

For long term funds to become available to users of long term funds, various conditions have to be fulfilled. First, there should be sufficient savings in the economy. Second, right kind of long term instruments should be issued by companies. Such financial instruments will only be issued if there are a sufficient number of long term projects which are being implemented. Finally, there should be right kind of financial intermediaries which facilitate the transfer of funds from the savers in the economy to those who make investments in physical assets.

Domestic Savings

The three major segments of the economy may be divided into: "household", "private corporate" and "government segments". The overall savings rate is determined by the savings rate of these individual segments. For example, in India, overall savings rate is nearing 30 per cent of gross domestic product (GDP). Out of the overall savings rate, the maximum contribution is made by the household segment. On the other hand, on account of the large fiscal deficit of the government, government dissavings had become the norm in India. However, during the last couple of years, the government segment has started contributing to savings again, albeit in a minor manner.

Net Inflow from Abroad

Domestic savings can be buttressed by net inflow from abroad. In India, for example, foreign direct investments, foreign institutional investments and external commercial borrowings have started contributing to fund availability for domestic firms.

Gross Domestic Capital Formation (GDCF)

Domestic savings plus net inflow from abroad can be used for domestic investments. This is also known as gross domestic capital formation (GDCF). Financial instruments mentioned earlier in this unit, viz., equity, preference capital, debentures (both non-convertible and convertible) and term loans can be used to raise long term funds. Further, with globalisation, well run firms are able to go abroad to access long-term funds globally. For example, financial instruments like American Depository Receipts (ADRs), Global Depository Receipts (GDRs) and Foreign Currency Convertible Bonds (FCCBs) have become available to domestic firms for accessing long term funds in international markets.

Role of Financial Markets

A developed financial market plays a number of important roles. First, price discovery is a key function of financial markets. Buyers as well as sellers of financial instruments while trading in financial markets establish the prices of financial instruments. Price discovery is correctly done when an efficient financial market is available. Market prices have to take into account factors such as time preferences of people, risk return trade-off, etc. In the capital markets many investors make deals during the day. In efficient capital markets, screen based trading systems make these deals transparent. As there are usually a large number of buyers and sellers in the capital markets, demand and supply help in determining the prices. This will happen only if a few investors do not manage to influence security prices.

Financial markets also provide liquidity to financial assets. Investors, especially long term investors, usually invest in long term financial instruments because they know that they can dispose of the financial instruments if any contingency arises. On account of features of financial instruments like transferability and negotiability, it is possible for firms to raise long term funds from investors who often have short-term and medium-term investment horizons.

Financial markets should also reduce the cost of transacting. These costs include search costs and information costs. Search costs include costs such as advertising and marketing expenses for buying or selling an issue. Other search costs include the time and effort put in to locate customers. Information costs are costs incurred in evaluating the investment merits of financial assets.

NOTES

An important institution which enables investors form an opinion of the relative capacity of a borrowing entity to service its debt obligations is a credit rating agency. Credit rating agencies undertake financial analysis and assessment of financial products, individual institutions and governments. Credit rating helps in the development of financial markets as they save the investors' time and money and enables him to take quick decisions. Credit rating also provides a means of pricing the risk premium that should be attached to various financial instruments. The world's biggest rating agencies are Moody's Investor Service and Standard and Poor (S&P). The prominent rating agencies in India are Credit Rating Information Services of India Limited (CRISIL), Investment Information and Credit Rating Agency of India Limited (ICRA), Credit Analysis and Research Limited (CARE) and Fitch Ratings India Private Limited.

Capital Markets

Capital markets facilitate the allocation of funds between savers and borrowers. As mentioned earlier, this allocation will be optimum if the capital markets have efficient pricing mechanism. Capital market efficiency will only be possible if securities traded on the capital market exchanges are able to reflect and incorporate all relevant information quickly in their prices.

For capital markets to be able to raise long term funds in an efficient manner as well allocate the funds efficiently, both the primary market and secondary market should function properly. The primary market is the market in which private sector companies, public sector companies as well as governments issue new securities. Companies raise new capital in the primary market through rights issues, public issues or private placement of securities. The secondary market, on the other hand, deals with buying and selling of securities already issued and listed in the stock market. The secondary market may also include the over-the-counter (OTC) market and the derivatives market. In the OTC market, the buyer and the seller negotiate the price, while the derivatives market deals with futures and options.

The capital market has to be well regulated in order for the market to gain the trust of the investors. For example, while raising funds from the public, the usual method is for the company to issue a prospectus so that prospective investors know more about the company and also what the company desires to do with the funds raised. The capital market regulator also needs to support an environment which facilitates easy buying and selling of listed securities as well as ensure the smooth functioning of the settlement and payment mechanism. The capital market regulator should play an important role in protecting the interests of small investors by ensuring good corporate governance and prevent insider trading wherein people with inside information are able to take undue advantage. In India, the capital market regulator is the Securities and Exchange Board of India (SEBI).

Funds are raised in the primary market through various instruments. A sophisticated market has a number of variations of the standard instruments of debt and equity. These include non-convertible debentures, zero-interest bonds, deep discount bonds, convertible debentures, warrants and cumulative convertible preference shares. Governments also raise funds from the capital market by issuing long term dated securities.

In capital markets, merchant banks, also known as investment banks, support the raising of funds from the capital market. Merchant bankers assist companies by managing public issues and extending other services to companies.

Mutual funds are a means of raising funds from investors and investing in the capital market. Mutual funds mobilise savings from a large number of investors and invest these funds in shares and other securities. There are different types of mutual funds including equity oriented funds, debt funds, balanced funds, sector funds, etc. Mutual funds offer a number of advantages including diversification of financial assets, professional expertise and flexibility.

Other Financial Institutions

In a country's economic system, financial institutions include development banks, commercial banks, insurance companies and pension funds. These institutions lend long term funds to companies. These financial institutions also need to be well regulated. For example, in India, the

Reserve Bank of India (RBI) is the regulator for commercial banks while the Insurance Regulatory and Development Authority (IRDA) is the regulator of insurance companies.

Users of Long Term Funds

Companies, both private and public sector ones, require long term funds for their operations, including implementation of new projects. The capital budgeting decision involves a current outlay or series of outlays of cash resources in return for an anticipated flow of future benefits. Project financing techniques can be used for a large number of infrastructure related as well as large projects. Deals are often highly complex and thus require a sophisticated supporting mechanism. Project financing cases usually involve a large number of parties. These include borrowers, lenders, contractors, suppliers of equipment and raw materials, end users of completed project, the host Government, financial advisors, technical experts and lawyers. Apportionment of risks amongst parties involved is often of critical importance.

NOTES

3.8 LET US SUMMARIZE

- Ordinary share, preference share and debentures are three important securities used by the firms to raise funds to finance their activities.
- Ordinary shares provide ownership rights to ordinary shareholders. They are the legal owners of the company. As a result, they have residual claims on income and assets of the company. They have the right to elect the board of directors and maintain their proportionate ownership in the company, called the pre-emptive right.
- The pre-emptive right of the ordinary shareholders is maintained by raising new equity funds through rights offerings. Rights issue does not affect the wealth of a shareholder.
- The price of the share with rights-on gets divided into ex-rights price and the value of a right. So what the shareholder gains in terms of the value of right he loses in terms of the low ex-rights price. However, he will lose if he does not exercise his rights.
- Debenture or bond is a long-term promissory note. The debenture trust deed or indenture defines the legal relationship between the issuing company and the debenture trustee who represents the debenture holders.
- Debenture holders have a prior claim on the company's income and assets. They will be paid before shareholders are paid anything.
- Debentures could be secured and unsecured and convertible and non-convertible. Debentures are issued with a maturity date. In India, they are generally retired after 7 to 10 years by instalments.
- Preference share is a hybrid security as it includes some features of both an ordinary share and a debenture. In regard to claims on income and assets, it stands before an ordinary share but after a debenture.
- Most preference shares in India have a cumulative feature, requiring that all past outstanding preference dividends be paid before any dividend to ordinary shareholders is announced.
- Preference shares could be redeemable, i.e., with a maturity date or irredeemable i.e., perpetual, without maturity date. Like debentures, a firm can issue convertible or non-convertible preference shares.
- A company can also raise funds in the form of fixed deposits from the public shareholders to meet its short-term fund requirements.
- There are a large number of factors which affect raising of long term funds by companies. Those include level of domestic savings. Net inflow from abroad, a well functioning capital market and innovative instruments.

Check Your Progress

15. What are the main sources of savings which contribute to investments in the economy?
16. How do we ensure a capital market which functions in an efficient manner?

NOTES

3.9 KEY CONCEPTS

Convertible debenture
Debentures
Loan amortisation
Preference shares
Sinking fund
Yield
Credit rating
Deep-discount debentures
Ordinary shares
Project financing
Straight debenture
Yield-to-maturity
Current yield
Hybrid security
Pre-emptive rights
Rights Issue
Underwriting
Zero-interest debentures
Public deposits

3.10 ANSWERS TO 'CHECK YOUR PROGRESS'

1. The holders of ordinary shares, called shareholders, are the legal owners of the company. The ordinary shares do not have a maturity date. The shareholders are entitled to dividend, which is not fixed, but variable. Distribution of dividend depends upon the income earned by the company and the discretion of management (the Board of Directors).
2. Authorised share capital of a company represents the maximum amount of capital that a company can raise from shareholders. On the other hand, the portion of the authorised share capital which has been offered to the shareholders is called the issued share capital.
3. The issued price of an ordinary share may consist of two parts: the par value and the share premium. The par value is the price per ordinary share of the company, which is usually Rs. 100 or Rs. 10. Any amount which is in excess of the par value is the share premium. In the case of new companies, shares are usually issued at par value. However, once the company becomes profitable, a company may issue further ordinary shares at a premium.
4. The total shareholders' equity is the sum of three components, viz. paid-up share capital, share premium and reserves and surplus.
5. The ordinary shareholder has a residual claim on assets of the company on liquidation after the claims of debt holders and preference shareholders are satisfied. The ordinary shareholders are the true owners of the company and have voting rights. Each ordinary share has one vote. The ordinary shareholder can vote on important matters like election of directors. The shareholder also enjoys the pre-emptive right of maintaining his proportionate share of ownership in the company. Finally, the shareholder's liability is limited to the amount of her investment in the shares of the company.
6. From the company's point of view, ordinary share capital is permanent share capital and is not redeemable. Increase in equity capital increases the company's financial base, and thus enables it to raise money from other sources. A company is also not obliged to pay dividend, and will pay dividend only if there is sufficient income earned by the company. However, shares have a higher cost. This is because dividends are not tax deductible, while interest payments are tax deductible. Further, floatation costs on ordinary shares are usually higher than those on debt.
7. Public issue of equity share capital means raising share capital directly from the public. On the other hand, private placement of shares implies issuance of shares to a few select investors. Private placement may be preferred when small amount of funds have to be raised. The speed at which funds can be raised through the private placement route is usually faster than issuing shares through the public issue route. The cost of raising funds through the private placement route is less.
8. A rights issue involves selling of ordinary shares to the existing shareholders of the company. New ordinary shares can be issued to the present equity shareholders only on a pro-rata basis. However, shareholders can forfeit this right through a special resolution.
9. From a shareholder's point of view, the main advantage of a rights issue is that the existing shareholders' control is maintained on account of the pro rata issue of shares. From a company's point of view, a rights issue is less expensive than raising funds through a public

issue. However, a major disadvantage of a rights issue is that usually limited amounts can be raised from a rights issue as compared to a public issue.

10. A preference share is known as a hybrid security as it possesses a number of features of both ordinary shares and debentures. It is similar to an equity share as dividends paid are not tax deductible and non-payment of dividends does not lead to insolvency. In some cases preference capital may not have a fixed maturity date. On the other hand, preference shares are similar to debenture holders in that the dividend rate is fixed, preference shares have claims on income and assets prior to equity shareholders, they do not share in residual earnings and they usually do not have voting rights.
11. The major types of debentures are non-convertible debentures (NCDs), fully convertible debentures (FCDs) and partly convertible debentures (PCDs). FCDs are convertible into shares as per the terms of the issue, viz. price and time of conversion. The rate of interest payable on FCDs are usually less than that on NCDs since they carry the attraction of being convertible to shares. PCDs have two parts, viz. a convertible part and a non-convertible part. NCDs have no convertible option and are repayable on maturity. The investor is entitled for interest. Zero-interest debentures can also be issued. Such debentures are issued at a discount to the issue price, with the difference between the issue price and the maturity value being the implicit amount of interest.
12. In the case of non-convertible debentures, there is no equity dilution and debenture interest is tax deductible. On the other hand, there is legal obligation to repay principal and pay interest. However, in the case of firms with fluctuating sales and earnings, financial risk of a firm increases with debenture issues. Also restrictive covenants included in the debenture indenture may limit the company's operating flexibility.
13. Corporates raise funds in the form of fixed deposits mainly for meeting their short-term funding requirements.
14. In the case of non-banking and non-financial companies, the Central Government has issued the 'Companies (Acceptance of Deposits) Rules, 1975', while in the case of non-banking financial companies, the Reserve Bank of India has issued 'Non Banking Financial Companies Acceptance of Public Deposits (Reserve Bank) Directions 1998'. These rules have to be complied with along with the provisions of Section 58A of the Companies Act.
15. Domestic savings plus net inflow from abroad contribute to gross domestic capital formation or investments in the economy. The three segments of the economy which contribute to domestic savings are household, private corporate and government segments.
16. First, a well functioning capital market requires a strong, independent and efficient capital market regulator. In India, the capital market regulator is Securities and Exchange Board of India (SEBI). The capital market regulator plays an important role in developing both the primary and secondary markets. Through the primary market, funds are raised by firms using different types of financial instruments, while the secondary market ensures smooth buying and selling of securities. The capital market regulator also has to ensure good corporate governance in order to protect small investors and prevent insider trading.

3.11 QUESTIONS AND EXERCISES

Review Questions

1. What is an ordinary share? How does it differ from a preference share and a debenture? Explain its most important features.
2. What are the advantages and disadvantages of ordinary shares to the company? What are the merits and demerits of the shareholders' residual claim on income from the investors' point of view?
3. What is the significance of voting rights to the ordinary shareholders? What is a proxy? Why do proxy fights occur?

NOTES

4. What is a rights issue? What are its advantages and disadvantages from the company's and shareholders' points of views?
5. Since the rights issue allows the ordinary shareholders to purchase the shares at a price much lower than the current market price, why does not shareholders' wealth increase? Illustrate your answer.
6. What is a debenture? Explain the features of a debenture.
7. What are the *pros* and *cons* of debentures from the company's and investors' point of views?
8. Why is a preference share called a hybrid security? Do you agree that it combines the worst features of ordinary shares and bonds?
9. Explain the advantages and disadvantages of preference shares to the company.
10. What are fixed deposits from public? What are their features?
11. What is the role of financial markets in an economy?

Exercises

1. A firm is thinking of a rights issue to raise Rs 5 crore. It has a 5 lakh shares outstanding and the current market price of the share is Rs 170. The subscription price on the new share will be Rs 125 per share. (*ii*) How many shares should be sold to raise the required funds? (*ii*) How many rights are needed to purchase one new share? (*iii*) What is the value of one right?
2. A company is considering a rights offering to raise funds to finance new projects, which require Rs 4.5 crore. The flotation cost will be 10 per cent of funds raised. The company currently has 20 lakh shares outstanding and the current market price of its share is Rs 100. The subscription price has been fixed at Rs 50 per share. (*i*) How many shares should be sold to raise the funds required for financing the new projects? (*ii*) How many rights are required to buy one new share? (*iii*) What is the value of one right? (*iv*) Show the impact on a shareholder's wealth who holds required rights to buy one new share if (*a*) he exercises rights, or (*b*) sells his rights, or (*c*) does not exercise rights.
3. The Greaves Company, started in 1922, is a diversified company. Having commenced operation as trading and servicing of engineering equipments, it diversified into manufacturing and marketing. The company's proposed capital expenditures include (*a*) expansion of the capacity of diesel engine from 22,500 units to 32,500 units in 1992–93, 40,000 units in 1993–94 and 55,000 units in 1994–95 at a cost of Rs 37.9 crore, (*b*) manufacture of 3-wheeler diesel unit, a forward integration project, at a cost of Rs 18.8 crore, with installed capacity of 8,000 units in 1993–94, 10,000 units in 1994–95 and 20,000 units in 1995–96, (*c*) manufacture of vibratory compactors at a cost of Rs 2.06 crore, (*d*) R&D capital expenditure of Rs 3.62 crore for developing a portable diesel low noise, smaller HP engines, (*e*) investment of Rs 49.4 crore in the equity of three companies, (*f*) investment of Rs 73.0 crore in a subsidiary for the manufacture of engineering plastics and (*g*) normal capital expenditure of Rs 35 crore for the enhancement of long-term resources. Of the first project only cost equal to Rs 30.1 crore will be met of the present issue.

   The company has proposed to issue 144 lakh equity shares of Rs 10 each at a premium of Rs 70 each totalling to Rs 115.21 crore in the ratio of 1 : 1 on rights basis. The Rs 10 paid-up share of the company has a market price of Rs 102.50 and a net asset value (NAV) of Rs 44.80. The company has made the following projections:

	1993–94	***1994–95***	***1995–96***
Revenues (Rs crore)	360.00	420.00	563.00
Net profit (Rs crore)	17.10	18.10	25.30
EPS (Rs)	11.78	7.38	9.00
NAV (Rs)	62.96	71.87	78.86

NOTES

The following are a few indicators of the company's performance during last two years:

	1991–92	*1992–93*
Revenues (Rs crore)	250.0	285.0
Pre-tax profits (Rs)	10.7	12.0
Equity dividend (%)	20.0	23.0
Borrowing (Rs crore)	57.0	74.0
Interest (Rs crore)	7.0	12.0
EPS (Rs)	–	7.2

Source: The Economic Times , 14 December 1992.

Critically evaluate Greaves' rights issue.

UNIT 4 LEASE FINANCE

NOTES

Structure

4.0 INTRODUCTION

The traditional financing is related to the liability side of the balance sheet. The firm issues long-term debt or equity to meet its financing needs, and in the process, expands its capitalisation. The dangers of traditional financing are that equity becomes an expensive method of financing because of decreasing corporate earnings and low price-earning ratios. The high rate of inflation causes long-term debt to be an expensive source of financing as interest rates rise. The corporate finance managers, therefore, are developing financing alternatives related to the asset side of the balance sheet. These alternatives may lower the cost and redistribute the risk. Asset-based financing uses assets as direct security. There are many possibilities. We shall discuss lease financing in this unit.[1]

4.1 UNIT OBJECTIVES

- Define lease and highlight its true advantages
- Explain methods for evaluating a lease
- Discuss the concept of a leveraged lease

1. The topic of leasing is an adaptation of article by I.M. Pandey, Myths and Realities about Leasing, *Vikalpa*, Vol. II, No. 4, Oct.–Dec. 1986, and the topic of project financing is adapted from S. Sinha, "Return to Equity, Financial Structure, and Risk Contracting in Infrastructure Projects", *Vikalpa*, Vol. 20, No. 4, Oct.–Dec. 1995.

NOTES

4.2 LEASE FINANCING

Leasing is widely used in Western countries to finance investments. In USA, which has the largest leasing industry in the world, lease financing contributes approximately one-third of total business investments. In the changing economic and financial environment of India, it has assumed an important role. What is lease financing? What are its advantages and disadvantages? How can a lease be evaluated?

4.2.1 Lease Defined

Lease is a contract between a lessor, the owner of the asset, and a lessee, the user of the asset. Under the contract, the owner gives the right to use the asset to the user over an agreed period of time for a consideration called the **lease rental**. The lessee pays the rental to the lessor as regular fixed payments over a period of time at the beginning or at the end of a month, quarter, half-year, or year. Although generally fixed, the amount and timing of payment of lease rentals can be tailored to the lessee's profits or cash flows. In **up-fronted leases**, more rentals are charged in the initial years and less in the later years of the contract. The opposite happens in **back-ended leases**. At the end of the lease contract, the asset reverts to the lessor, who is the legal owner of the asset. As the legal owner, it is the lessor not lessee, who is entitled to claim depreciation on the leased asset. In long-term lease contracts, the lessee is generally given an option to buy or renew the lease. Sometimes, the lease contract is divided into two parts—primary lease and secondary lease for the purposes of lease rentals. **Primary lease** provides for the recovery of the cost of the asset and profit through lease rentals during a period of about four or five years. A perpetual, secondary lease may follow it on nominal lease rentals. Various other combinations are possible.

Although the lessor is the legal owner of a leased asset, the lessee bears the risk and enjoys the returns. The lessee benefits if the leased assets operates profitably, and suffers if the asset fails to perform. Leasing separates ownership and use as two economic activities, and facilitates asset use without ownership.[2]

A lessee can be individual or a firm interested in the use of an asset without owning. Lessors may be equipment manufacturers or leasing companies who bring together the manufacturers and the users. In USA, equipment manufacturers are the largest group of lessors followed by banks. In India, independent leasing companies form the major group in number in the leasing industry. Banks together with financial institutions are the largest group in terms of the volume of business.

4.2.2 Types of Leases

Two types of leases can be distinguished:

- Operating lease
- Financial lease
- Sale-and-lease-back

Operating lease Short-term, cancellable lease agreements are called **operating leases**. Convenience and instant services are the hallmarks of operating leases. Examples are: a tourist renting a car, lease contracts for computers, office equipment, car, trucks and hotel rooms. For assets such as computers or office equipment, an operating lease may run for 3 to 5 years. The lessor is generally responsible for maintenance and insurance. He may also provide other services. A single operating lease contract may not fully amortise the original cost of the asset; it covers a period considerably shorter than the useful life of the asset. Because of the short duration and the lessee's option to cancel the lease, the risk of obsolescence remains with the lessor. Naturally, the shorter the lease period and/or higher the risk of obsolescence, the higher will be the lease rentals.

Financial lease Long-term, non-cancellable lease contracts are known as **financial leases**.

2. Miller, M.H. and C.W. Upton, Leasing, Buying and the Cost of Capital, *Journal of Finance*, 1976, 31, pp. 761–86.

Examples are plant, machinery, land, building, ships, and aircraft. In India, financial leases are very popular with high-cost and high technology equipment. Financial leases amortise the cost of the asset over the term of lease; they are, therefore, also called **capital** or **full-payout leases**. Most financial leases are **direct leases**. The lessor buys the asset identified by the lessee from the manufacturer and signs a contract to lease it out to the lessee.

NOTES

Sale-and-lease-back Sale-and-lease-back is a special financial lease arrangement. Sometimes, a user may sell an (existing) asset owned by him to the lessor (leasing company) and lease it back from him. Such **sale-and-lease-back** arrangements may provide substantial tax benefits. For example, in April 1989, Shipping Credit and Investment Corporation of India (SCICI) purchased Great Eastern Shipping Company's bulk carrier, Jag Lata, for Rs 12.5 crore and then leased it back to Great Eastern on a five-year lease, the rentals being Rs 28.13 lakh per month. The ship's written-down book value was Rs 2.5 crore.

In financial lease, the maintenance and insurance are normally the responsibility of the lessee. The lessee also bears the risk of obsolescence. A financial lease agreement may provide for renewal of contract or purchase of the asset by the lessee after the contract expires. The option of purchasing the leased asset by the lessee is not incorporated in the lease contract in India, because if such an option is provided the lease is legally construed to be a hire purchase agreement.

There are a large number of lease terminologies used in practice. Exhibit 4.1 explains some of the commonly used lease terms.

EXHIBIT 4.1: COMMONLY USED LEASE TERMINOLOGY

Two basic types of lease are: (*a*) financial lease and (*b*) operating lease. Finance lease in further divided into (*i*) leveraged lease, (*ii*) sale-and-lease-back, (*iii*) cross-border lease.

- ***Leveraged lease*** Leveraged lease involves lessor, lessee and financier. Lessor (leasing company) provides equity equal to about 25 per cent of the asset's cost while the remaining amount is provided by the financier (a bank or a financial institution), mainly as loan. Leveraged lease is a popular method of financing expensive assets.
- ***Sale-and-lease-back*** As discussed in the main text, the lessee first sells asset owned by him to the lessor and then leases it back from the lessor. This provides liquidity as well as possible tax gains to the lessee.
- ***Cross-border lease*** In case of cross-border or international lease, the lessor and the lessee are situated in two different countries. Because the lease transaction takes place between parties of two or more countries, it is called cross-border lease. It involves relationships and tax implications more complex than the domestic lease. When the lease transaction takes place between three parties manufacturer/vendor, lessor and lessee in three different countries, it is called *foreign-to-foreign lease*.

There many other terms used by the leasing industry. Some of them are defined below.

- ***Closed and open ended lease*** In the close ended lease, the asset gets transferred to the lessor at the end, and the risk of obsolescence, residual value etc. remain with the lessor being the legal owner of the asset. In the open ended lease, the lessee has the option of purchasing the asset at the end of lease.
- ***Direct lease*** It is a mix of operating and finance lease on a full payout basis and provides for the purchase option to the lessee.
- ***Master lease*** Master lease provides for a period longer than the asset's life and holds the lessor responsible for providing equipment in good operating condition during the lease period.
- ***Percentage lease*** Percentage lease provide for a fixed rent plus some per cent of the previous year's gross revenue to be paid to the lessor. This ensures protection against inflation.
- ***Wet and dry lease*** In the aircraft industry, when the lease involves financing as well as servicing and fuel, it is called wet lease. Dry lease provides only for financing.
- ***Net net net lease*** In the triple net (net net net) lease, the lessee is obliged to take care of maintenance, taxes and insurance of the equipment.
- ***Update lease*** Update lease is intended to protect the lessee against the risk of obsolescence. The lessor agrees to replace obsolete asset with new one at specified rent.

NOTES

4.2.3 Cash Flow Consequences of a Financial Lease

A financial lease has cash flow consequences. It is a way of normal financing for a company. Suppose a company has found it financially worthwhile to acquire an equipment costing Rs 800 lakh. The equipment is estimated to last eight years. Instead of buying, the company can lease the equipment for eight years at an annual (end-of-the period) lease rental of Rs 160 lakh from the manufacturer. Suppose that the company will have to provide for the maintenance, insurance, and other operating expenses associated with the use of the asset in both alternatives—leasing or buying. Assume a straight-line depreciation for tax purposes, a borrowing rate of 14 per cent, and a marginal tax rate of 35 per cent for the company. The cash flow consequences of the lease (as compared to the buy option) are shown in Table 4.1. They would be:

- ***Avoidance of the purchase price*** **(P_0)** The company can acquire the asset without immediately paying for it. Cash outflow saved is equivalent to a cash inflow; there is a cash inflow of Rs 800 lakh.
- ***Loss of depreciation tax shield*** **(DTS)** Depreciation is a deductible expense and saves taxes. Depreciation tax shield is equal to the amount of depreciation each year multiplied by the tax rate. The company will lose a series of depreciation tax shields when it takes the lease. The straight-line depreciation will be: Rs 800/8 = Rs 100 lakh, and the lost DTS will be: Rs 100 × 0.35 = Rs 35 lakh.
- ***After-tax payment of lease rentals (L_t)*** There is a cash outflow of Rs 160 lakh per year as lease payment. But these payments will yield tax shield of Rs 160 × 0.35 = Rs 56 lakh per year. Thus, the after-tax lease payments would be Rs 160 lakh – Rs 56 lakh = Rs 104 lakh per year.

  The cash flow consequences of leasing depend on the tax status of a company; tax shields are available only when the company pays taxes. In case it does not, then depreciation is worth nothing to it. Also, tax shields would vary with the marginal tax rate for the company.

Table 4.1: Cash Flow Consequences of a Lease

(Rs in lakh)

Year (1)	*Purchase Price Avoided (P_0)* (2)	*Depreciation (D)* (3)	*Depreciation Tax Shield (DTS) (4) = (3) × 0.35*	*Before-tax Lease Rentals (BTLR)* (5)	*After-tax Lease (ALR) (6) = .65 × (5)*	*Net Cash Flow (NCF) (7) = (1) + 4 + (5)*
0	800				800	
1		–100	–35	–160	–104	–139
2		–100	–35	–160	–104	–139
3		–100	–35	–160	–104	–139
4		–100	–35	–160	–104	–139
5		–100	–35	–160	–104	–139
6		–100	–35	–160	–104	–139
7		–100	–35	–160	–104	–139
8		–100	–35	–160	–104	–139

4.2.4 Disadvantages of Leasing

We can now examine the disadvantages of leasing.[3]

3. A variety of views exist on the merits and demerits of leasing. For example, see Brealey, R. and Myers S., *Principles of Corporate Finance*, McGraw Hill, 1991, pp. 654–58.

NOTES

Leasing does not provide 100 per cent financing One misconception about leasing is that it provides 100 per cent financing for the asset as the lessee can avoid payment for acquiring the asset. The lessee, it is assumed, can preserve his liquid resources for other purposes. When a firm borrows to buy an asset, cash increases with borrowing and decreases by the same amount with the purchase of the asset. It has the asset to use but a liability to repay the loan and interest. In leasing also, the firm acquires the asset and incurs the liability to make fixed payments in future. In practice, therefore, leasing, like borrowing, commits the company for a stream of payments in future.

Leasing does not provide off-the-balance-sheet financing As the lessee may not be obliged to disclose his lease liability on the balance sheet, it is believed that leasing does not affect the debt-equity ratio while borrowing increases his debt-equity ratio. The myth goes, therefore, that leasing provides off-the-balance-sheet financing leaving the firm's debt raising ability intact. This is a fallacious argument. First, a debt-equity norm puts a limit on the firm's total borrowings. Its ***debt capacity*** depends on its debt servicing ability rather than the balance sheet ratios. Contractual obligations of any form through a lease or loan, reduce debt servicing ability and add to financial risk. Lenders recognise the lessee's cash flow burden arising from lease payments. As a lease uses the firm's debt capacity, it displaces debt.

Leasing can certainly help companies which have enough debt servicing ability but cannot borrow from banks or financial institutions on account of institutional norms on debt-equity or regulations. Under no circumstances can a lease enhance the firm's debt capacity.

Leasing does not improve performance Another myth is that the return on investment (profits divided by investment) will increase since a lease does not appear as an investment on the books or the balance sheet. Besides, back-ended leases enable showing higher profits in the initial years of the lease. Such performance ratios are illusory.

A firm's value is affected by the value of its assets and liabilities rather than book profits created through accounting adjustments. A lease will create value to the firm only if the benefits from it are more than its costs.

Leasing does not avoid control of capital spending Another misconception is that leasing does not need capital expenditure screening as no investments are involved. Since a long-term lease involves long-term financial commitments, it ought to be screened accordingly in any good capital expenditure planning and control system. If leasing is not screened and is used to circumvent capital expenditure screening and approval, it may add to the firm's risk, make it vulnerable to business fluctuations, and endanger its survival.

4.2.5 Advantages of Leasing

If all these myths are exploded, why then should a company lease instead of following the straightforward alternative of a secured loan and purchase of the asset? The primary consideration is the cost of lease *vs.* cost of buying. They can be different. For, if a firm is incurring losses or making low profits, it cannot take full advantage of the depreciation tax shield on purchase of assets. It is, therefore, sensible for it to let the leasing company (lessor) own the assets, take full advantage of tax benefits, and expect that the lessor passes on at least some part of the benefits in the form of reduced lease rentals. Both the lessor and the lessee may stand to gain financially.

Apart from these tangible financial implications, there are other real advantages to leasing.

Convenience and flexibility If an asset is needed for a short period, leasing makes sense. Buying an asset and arranging to resell it after use is time consuming, inconvenient and costly.

Long-term financial leases also offer flexibility to the user. In India, borrowing from banks and financial institutions involve long, complicated procedures. Institutions often put restrictions on borrowers, stipulate conversion of loan into equity, and appoint nominee directors on the board.[4]

4. The stipulations of mandatory conversion of loan into equity and appointment of nominee directors have been removed now.

NOTES

Financial leases are less restrictive and can be negotiated faster, especially if the leasing industry is well developed. Yet another advantage of a lease is the flexibility it provides to tailor lease payments to the lessee's cash flows. Such tailored payment schedules are helpful to a lessee who has fluctuating cash flows.

New or small companies in non-priority sectors such as confectioneries, bottlers and distilleries find it difficult to raise funds from banks and financial institutions in India.

Shifting of risk of obsolescence When the technology embedded in assets, as in a computer, is subject to rapid and unpredictable changes, a lessee can, through a short-term cancellable lease, shift the risk of obsolescence to the lessor. A manufacturer-lessor, or a specialised leasing company, is usually in a better position than the user to assume the risk of obsolescence and manage the fast advancing technology. Specialised leasing companies are emerging in India. In fact, in such situations, the lessee is buying an insurance against obsolescence, paying a premium in terms of higher lease rentals.

Maintenance and specialised services With a full-service lease, a lessee can look for advantages in maintenance and specialised services. For example, computer manufacturers who lease out computers are better equipped than the user to provide effective maintenance and specialised services. Their cost too may be less than what the lessee would have to incur if he were to maintain the leased asset. The lessor is able to provide maintenance and other services cheaply because of his larger volume and specialisation. He may pass on a part of that advantage to the lessee. We do not yet have in India many integrated specialised leasing companies.

In the face of such myths and realities, how does one evaluate a lease?

4.3 EVALUATING A FINANCIAL LEASE

Leasing is a two-step decision for the lessee firm. First, it has to evaluate the economic viability of the asset as an investment. If the asset has a positive net present value, the company should proceed to acquire the asset. Once it has decided to do so, the firm can compare the costs of financing the asset through leasing with that of normal sources of financing.

When the firm finances the asset by normal financing, it takes the following two steps.[5]

- Purchases the asset for cash, for say, *X*.
- Purchases the necessary cash by selling a package of financing instruments (debt and/ equity), taking into account its long-term target capital structure, for say, *Y*.

When the asset is leased, the following two transactions take place simultaneously:

- Purchase of the asset for cash, for say, *A*.
- Purchase of necessary cash, for say, *B*, by (*i*) giving up the asset's depreciation tax shield, and salvage value and (*ii*) by agreeing to make a stream of cash payments as lease rentals to the lessor.

It is to the firm's advantage to finance the asset by leasing if there is a positive difference, in net present value terms, of *B* over *Y*. Thus, in evaluating a lease, a firm should be concerned about how the value of the firm is affected if the lease is used as a 'substitute' for normal finance.[6] The net present value of an asset (investment project) is found by discounting the cash flows associated with the use of the asset by the firm's cost of capital, given its target debt-equity structure.

In evaluating the lease, a key question is: at what rate should the cash flows be discounted to arrive to net present values? Should it be cost of capital of the firm or its after-tax borrowing rate?

Check Your Progress

1. What are the basic features of an operating lease?
2. What is a financial lease?
3. What is the treatment of depreciation in the case of lease financing?

5. Schall, L., The Lease-or-Buy and Asset Acquisition Decision, *Journal of Finance*, September 1974, pp. 1203–14; and S.C. Myers *et. al.*, Valuation of Financial Lease Contracts, *Journal of Finance*, June 1976, pp. 799–820.
6. Bower, *op. cit.*; Myers *et. al., op. cit.*

There is much debate on this question. The weight of the arguments, however, is in favour of using the after-tax borrowing rate since leasing is functionally equivalent to a secured debt. Leasing affects the firm's capital structure exactly the same way as debt does; lease displaces the firm's debt capacity.

NOTES

Leasing can be evaluated using either the equivalent loan method or the net advantage of lease method. These are described next.

4.3.1 Equivalent Loan Method

The equivalent loan method of evaluating a financial lease consists of the following steps:[7]

- Find out the *incremental* cash flows from leasing.
- Determine the amount of equivalent loan such incremental cash flows can service (explained below).
- Compare the equivalent loan so found with lease finance. If the lease finance is more than equivalent loan, the firm should finance the asset by leasing (provided, as explained earlier, the asset is worth having).

Equivalent loan is that amount of loan, which commits a firm to exactly the same stream of fixed obligations, as does the lease liability. In our example, the net cash flows from leasing are as given in column 7 of Table 4.1. These cash flows can be said to "service" the loan. We can determine the amount of loan that they can service as follows.

The lease contract was completed with the last year's payment of Rs 139 lakh. This amount serviced a principal amount at the beginning of the eighth year and the after-tax interest for the eighth year. Let the outstanding amount at the beginning of the eighth year be *P*. If the interest rate is 14 per cent and tax rate, *T*, is 35 per cent, then the after-tax interest rate will be: $k_d (1 - T) = 0.14 (1 - 0.35) = 0.091$ or 9.1 per cent. We can write the following equation:

$$1.091P = 139$$

$$P = \frac{139}{1.091} = \text{Rs}\,127.41\,\text{lakh}$$

Thus, the cash flow of Rs 139 lakh in the eighth year is apportioned as: principal repayment of Rs 127.41 lakh and an after-tax interest (ATI) for the eighth year of: Rs 139 – Rs 127.41 = Rs 11.59 lakh. The before-tax interest (BTI) paid will be:

$$\text{ATI}/(1-T) = \text{Rs}\,11.59/0.65 = \text{Rs}\,17.84\,\text{lakh}$$

The equivalent outstanding loan at the beginning of seventh year would be equal to principal repayments in seventh and eighth years. The principal repaid in the eighth year was Rs 127.41 lakh. The after-tax interest in seventh year would be:

$$0.091\,(P + 127.41) = 0.091P + 11.59$$

The total amount paid in the seventh year was Rs 139 lakh. This was for repayment of principal, *P*, and the after-tax interest in the seventh year. We can write the equation as follows:

$$1.091P + 11.59 = 139$$

$$1.091P = 139 - 11.59 = P = 127.41/1.091 = \text{Rs}\,116.78\,\text{lakh}$$

Thus, in the seventh year, the principal repaid is Rs 116.78 lakh. The after-tax interest is: Rs 139 – Rs 116.78 = Rs 22.22 lakh, and the before-tax interest paid is: Rs 22.22 ÷ 0.65 = Rs 34.19 lakh.

Similarly, we can work backwards to calculate the equivalent loan in the year 0. The calculations are shown in Table 4.2. As can be seen from column (6) row 1 of Table 4.2, an initial equivalent loan of Rs 766.49 lakh could be serviced by the cash outflows of lease financing at 14 per cent before-tax interest rate.

7. See Brealey, R. and Myers, S., *op. cit.*, pp. 661–63 for discussion of the equivalent loan method.

NOTES

Table 4.2: Equivalent Loan Calculations

(Rs in lakh)

Year (1)	*Net Cash Flows* (2)	*Before-tax Interest* (3)	*After-tax Interest* (4)	*Principal Repaid* (5)	*Loan Outstanding* (6)
0					766.49
1	139	107.31	69.75	69.25	697.24
2	139	97.61	63.45	75.55	621.69
3	139	87.04	56.57	82.43	539.26
4	139	75.50	49.07	89.93	449.33
5	139	62.91	40.89	98.11	351.22
6	139	49.17	31.96	107.04	244.19
7	139	34.19	22.22	116.78	127.41
8	139	17.84	11.59	127.41	0

Should the firm accept lease financing? The lease cash flows can service an equivalent loan of Rs 766.49 lakh while the available lease finance for the same cash flows, is Rs 800 lakh. Thus, the lease finance is advantageous, and the firm should accept the decision to lease the equipment. The equivalent loan is, in fact, the present value of lease cash flows discounted at the after-tax cost of borrowing and is given by following equation:

$$\text{Equivalent loan} = \text{PV of cash flows of a lease}$$

$$\text{EL} = \sum_{t=1}^{n} \frac{(1-T)L_t + \text{DTS}_t}{[1+k_d(1-T)]^t} \quad (1)$$

Equation (1) can be modified to include other lease cash flows such as the operating expenses incurred by the lessor (or the lessee) on maintaining the leased asset and the salvage value of the asset forgone by the lessee.

4.3.2 Net Advantage of a Lease

Another method of evaluating a lease is by finding its net advantage. As discussed earlier, the direct cash flow consequences are:

- The purchase price of the asset, A_0, is avoided.
- The depreciation tax shield, DTS_t, is lost.
- The after-tax lease rentals, $(1 - T)\, L_t$, are paid.
- Lease financing also has an indirect effect; it displaces debt. Thus, the interest tax shield on the displaced debt, $Tk_d\, D_t$, is lost.

The present value of these flows can be calculated by discounting each flow by a rate that reflects its risk. The lease cash flows, including after-tax lease rentals and lost DTS are safe cash flows since the after-tax rentals and DTS are fixed and known. Hence, lease being equivalent to a loan, the after-tax lease cash flows can be discounted by the after-tax cost of borrowing, i.e., $k_d\,(1 - T)$. There is, however, controversy in the literature as to the appropriate discount rate to be applied to the lease cash flows.[8]

Appropriate discount rate One may argue[9] that the risk characteristics of the lease payments and tax shields are similar respectively to interest and principal payments of debt. Lease payments can thus be discounted at the firm's after-tax borrowing rate. The position is not very clear with respect to tax shields. They encompass some of the firm's business risks as they can be availed only when profits are made. But because of the carry forward provisions, the firm can use tax shields in the long run when it earns sufficient profits. If so, tax shields are relatively safe and their risk characteristics are not similar to the firm's risk.

8. Bower, *op. cit.*
9. Myers, *et. al., op. cit.*

NOTES

The problem of handling the indirect effect due to interest tax shield is related to the question of debt displaced by the lease. This is the difficult part in lease evaluation. The amount of debt displaced by the lease depends on the value of the lease liability, and lease liability depends on the amount of debt displaced. It is well established in literature that debt is valuable because of the tax deductibility of interest.[10] The optimum debt capacity of the firm, therefore, can be said to depend on the firm's business risk (variability of operating cash flows) and the value of its assets and tax shields. Tax shields generated by depreciation and interest are the firm's assets since they create economic value. The tax shields generated by the lease rentals can, therefore, be treated essentially the same way as those generated by depreciation and interest.

It is then possible to discount the after-tax rentals and depreciation tax shields at the after-tax borrowing rate. The after-tax borrowing rate implicitly recognises the lost interest tax shield on displaced debt.[11] Table 4.3 provides the present value of the lease cash flows discounted at the after-tax borrowing rate $(1 - T)\, k_d = (1 - 0.35)\, 0.14 = 0.091$ or 9.1 per cent. It may be seen that the present value of lease is equal to Rs 766.49 lakh. It is the same as the equivalent loan determined using the first method because the discount rate used for the lease cash flows was the same as the borrowing rate in both cases. Under the net advantage of lease method, it is possible to use a different rate for each stream, in which case, the present value of the lease would differ from the equivalent loan.

When the present value of lease is subtracted from the purchase price avoided, A_0, (Rs 800 lakh), we get the net advantage of leasing, which is:

$$\text{Net advantage of leasing} = A_0 - \text{Present value of lease cash flows}$$
$$= 800 - 766.49 = +\text{Rs}\,33.51\,\text{lakh}$$

Summary of present values shown in Table 4.3 is as follows:

(Rs in lakh)

Purchase price avoided, (P_0)	+ 800.00
Present value of depreciation tax shield, PV (DTS)	– 193.00
Present value of after-tax lease payments, PV $[(1 - T)L_t]$	– 573.49
Net advantage of leasing, NAL	+ 33.51

Table 4.3: Depreciation Shield and Cash Flows Under a Lease

(Rs in lakh)

Year (1)	*Purchase price avoided (2)*	*Lost depreciation tax shield (3)*	*After-tax lease rentals (4)*	*Net Cash Flows (5)*	*PV factor @ 9.1% (6)*	*Present Value (7)*
0	+800.00			800.00	1.0000	+800.00
1		–35.00	–104.00	–139.00	0.9166	–127.41
2		–35.00	–104.00	–139.00	0.8401	–116.78
3		–35.00	–104.00	–139.00	0.7701	–107.04
4		–35.00	–104.00	–139.00	0.7058	–98.11
5		–35.00	–104.00	–139.00	0.6470	–89.93
6		–35.00	–104.00	–139.00	0.5930	–82.43
7		–35.00	–104.00	–139.00	0.5435	–75.55
8		–35.00	–104.00	–139.00	0.4982	–69.25
Present value	+800.00	–193.00	–573.49	–766.49		+33.51

10. Modigliani, F. and M.H. Miller, Corporate Income Taxes and the Cost of Capital, *American Economic Review*, June 1963, pp. 433–43.
11. Bower, *op. cit.* and Myers *et. al., op. cit.*

NOTES

4.3.3 Net Present Value and Net Advantage of Leasing

The net advantage of leasing denotes the incremental advantage over the net present value of buying the asset through normal financing channels. A positive net advantage of leasing implies that leasing has an advantage over the net present value of the asset as an investment, which may itself be either positive or negative. A positive net advantage of leasing does not by itself imply that the asset should be acquired. The net present value of the asset should first be assessed as an investment. A positive net advantage of leasing implies advantage to leasing. It is possible that leasing may make a financially unattractive asset investment worthwhile. Suppose the net present value of an asset is negative Rs 40,000, and the lessor offers it under lease terms that have a positive net advantage to the buyer of, say, Rs 60,000. Then he can acquire the asset by leasing. His overall position would be a net present value of: Rs 60,000 – Rs 40,000 = Rs 20,000.

The lessee's overall gain will be enhanced by the positive net advantage of leasing in situation 1, that is, positive net present value (investment) and positive net advantage of leasing will add (Table 4.4). In situation 2, the lessee should not lease because it has a negative net advantage of leasing; he should buy the asset through normal financing. One should not set off negative advantage of leasing from positive net present value, since leasing is ruled out. Interpretation of situation 4 also needs caution. The option of buying the asset through normal financing is undesirable, since its net present value itself is negative. The lessee may acquire the asset by leasing if its net advantage more than compensates the negative net present value of investment.

Table 4.4: Combination of Net Present Value of Investment and Net Advantage of Leasing

Situation	*Net Present Value of Investment*	*Net Advantage of Leasing*	*Decision*
1	Positive	Positive	Lease
2	Positive	Negative	Buy
3	Negative	Negative	Reject
4	Negative	Positive	Lease if sum of net pre-sent value and net leasing advantage is positive, otherwise reject

4.4 CAN A LEASE BENEFIT BOTH LESSOR AND LESSEE?

What is the present value of a lease to the lessor? The present value of the lease cash flows to the lessor is given in Table 4.5. We assume that the lessor's tax rate is 35 per cent and the lending rate is 14 per cent. Note that the lease cash flows are the same as for lessee except for the change in signs; what the lessee loses the lessor gains and vice versa. There is a loss to the lessor. He will like to charge more lease rental from the lessee.

Table 4.5: Present Value of Lessor's Cash Flows

Cash flows	*Present Value (Rs in lakh)*
Purchase price	– 800.00
Depreciation tax shield (35 × 5.5143)*	+ 193.00
After-tax lease rental (104 × 5.5143)*	+ 573.49
Net present value	–33.51

*After-tax lease payment (1 – 0.35) L_t; 5.5143 is the present value factor of an annuity for 8 years at 9.1 per cent.

A lease will be taken when it benefits both the lessor and the lessee. It can benefit both when their tax rates differ. The lessor and the lessee determine the attractiveness of the lease rentals given their tax rates. Given the lessor's tax rate of 35 per cent, he can take full advantage of tax shields.

Check Your Progress

4. Under what conditions is a financial lease preferable over other normal sources of financing?

The minimum lease payments for the lessor to break-even would be:

$$\text{Net present value} = -800 + 193 + 5.5143 \times 0.65 L_t$$

$$3.5843 L_t = 607$$

$$L_t = 607 / 3.5843 = \text{Rs}\,169.34\ \text{lakh}$$

NOTES

The minimum lease rentals, which the lessor should charge to earn 9.1 per cent after-tax required rate of return is Rs 169.34 lakh. The monthly rate per Rs 1,000 worth of asset works out at Rs 17.16.[12]

Let us assume that the tax rate of the lessee is 0. Hence, there is no loss of depreciation tax shields foregone by him. The present value to the lessee of the lease is given in Table 4.6.

Table 4.6: Present Value of Lessee's Cash Flows (T = 0)

Cash flows	*Present Value (Rs in lakh)*
Purchase price avoided	+ 800.00
Present value of lease rentals 4.6389* × 160	–742.22
Net advantage of lease	+ 57.78

*The 4.6389 is present value annuity factor for 8 years at 14 percent. If cash flows are compounded monthly, the factor for 96 months at 1.667 per cent is 57.5655.

The break-even lease payments to the lessee would be as follows:

$$\text{Net advantage of leasing} = 800 - 4.6389 L_t = 0$$

$$L_t = 800 / 4.6389 = \text{Rs}\,172.45\ \text{lakh}$$

The maximum lease rental that the lessee will be prepared to pay would be Rs 172.45 lakh per annum. The monthly rental per Rs 1,000 of the asset is Rs 17.37 (at 14 per cent interest rate).

The break-even levels of lease payments of the lessor and the lessee give them adequate room for negotiations. Note that the break-even lease payments for both lessor and lessee would be the same if their tax rates are the same.

Suppose the actual lease rental in the example is Rs 170 lakh (instead of Rs 160 lakh), then both the lessor (with 35 per cent tax rate) and the lessee (with zero tax rate) will benefit from leasing. The lessor's gain is: Rs 170 – 169.34 = Rs 0.66 lakh per annum and the lessee's gain is Rs 172.45 – 170 = Rs 2.45 lakh per annum. The present value of the lessor's gain (at 9.1 per cent discount rate) is: (1 – 0.35) 0.66 × 5.5143 = Rs 2.37 lakh. The present value of the lessee's gain should be calculated at 14 per cent discount rate, since we have assumed that his tax rate is 0. Thus, the present value of the lessee's gain would be: Rs 2.45 × 4.6389 = Rs 11.37 lakh.

The lessee has benefitted because the lessor has passed on to him a part of the tax shield he got in the form of reduced rentals. The difference in the lessor's tax rate and the lessee's rate provides the opportunity that the lease would be mutually beneficial to both the lessor and the lessee. In the absence of taxes, it is hard to believe that leasing would be advantageous if the capital markets are reasonably well functioning.

4.4.1 Where from do leasing Benefits Come?

How can both the lessee and the lessor benefit from a lease? Both gain at government's expense because of the difference in their tax rates. The government gains from the tax on lease rentals while it loses on depreciation and interest tax shields. The implicit principal payments in a lease rental are shielded by depreciation, while interest deductions provide for implicit return on the

12. The present value factor of an annuity for 96 months (8 years × 12) at the monthly rate of 0.007583 per cent (i.e., 0.091/12) will be calculated to find out the monthly lease rentals. Thus

$$\text{NPV} = -800 + 193 + 0.65 \times 68.0173\, L_t = 0$$

$$L_t = 607/44.2113 = \text{Rs}\ 13.73\ \text{lakh}$$

Rs 13.73 lakh per month is the break-even rental for asset worth Rs 800 lakh. Therefore, monthly rental for an asset worth Rs 1,000 is: Rs (13.73/800) × 1,000 = Rs 17.16.

NOTES

lessee's capital. With a positive interest rate and accelerated depreciation, the government's receipts of tax on lease rentals will fall short, in present value terms, of depreciation and interest tax shields.

Consider the example given. The gain to the lessor was Rs 2.37 lakh and to the lessee Rs 11.37 lakh adding up to Rs 13.74 lakh. This is exactly the net loss to the government as shown in Table 4.7.[13]

Table 4.7: Lessee's and Lessor's Benefits Equal Government Loss

		(Rs in lakh)
Loss:	Present Value of:	
	Depreciation tax shield (1)	– 193.00
	Interest tax shield on displaced debt (2)	– 148.82
Gain:	Present Value of:	
	Tax on lease rentals (3)	+ 328.10
	Net loss to the government	– 13.72

Notes:

(1) Depreciation tax shield is taken from Table 4.3. It is assumed that the lessor can avail them and borrow against them.

(2) The lessor's rentals are similar to the fixed obligations under debt. Thus, under an equivalent loan situation, the government would have received tax on interest. The present value of the tax is the difference between present value of rentals at the 9.1 per cent adjusted cost and present value of rentals at the 14 per cent cost of capital. Thus (5.5143 – 4.6389) × 170 = Rs 148.82 lakh.

(3) The present value of tax on lease rentals received by the government equals: 0.35 × 170 × 5.5143 = Rs 328.10 lakh.

4.4.2 Net Advantage of a Lease (NAL) Including Operating Costs and Salvage Value

How do we incorporate analysis of operating cost and salvage value in the lease evaluation?

The following equation can be used to find out NAL:

$$\text{NAL} = A_0 - \sum_{t=1}^{n} \frac{(1-T)L_t + \text{DTS}_t}{[1+k_d\ (1-T)]^t} \tag{2}$$

where A_0 is purchase price of the asset, T is the tax rate of the company, L_t is the lease rental paid in year t, DTS_t is the depreciation tax shield in year t and k_d is the cost of borrowings.

We have so far assumed that the asset has no salvage value at the end of its life and that the lessee firm might incur the maintenance, insurance and other operating costs associated with the leased asset. Under a full-service lease, the lessor may bear the maintenance, insurance and operating costs. If so, the present value of the lease to the lessee will increase by the present value of the stream of after-tax operating costs. On salvage value, the value of the lease to the lessee will decline by the after-tax proceeds from the sale of assets at the end of its economic life. Both operating costs and salvage value are difficult to predict. Therefore, they should be discounted at a rate higher than the firm's borrowing rate. There is a fair degree of unanimity among academicians about using the firm's cost of capital for discounting operating costs and salvage value.[14] We can modify Equation (2) as follows to calculate the net advantage of leasing:

$$\text{NAL} = A_0 - \sum_{t=1}^{n} \frac{(1-T)L_t + \text{DTS}_t}{[1+k_d\,(1-T)]^t} + \sum_{t=1}^{n} \frac{(1-T)OC_t}{(1+k)^t} - \frac{\text{ATSV}_n}{(1+k)^n} \tag{3}$$

13. Myers, *op. cit.*
14. Bower, *op. cit.*

where k is the after-tax cost of capital of the firm, OC_t is the operating cost in year t and $ATSV_n$ is the after-tax salvage value of the leased asset at the end of the life, n. As per the latest tax rule in India, salvage value is not taxed rather the depreciable value of the asset is adjusted. This point is illustrated later on.

NOTES

Table 4.8: Cash Flows Under a Lease

(Rs in lakh)

Year (1)	*Asset Price Avoided* (P_0) (2)	*Depreciation Tax-shield lost* (DTS) (3)	*After-tax lease rentals* (ATLR) (4)	*After-tax operating expenses* (ATOE) (5)	*After-tax salvage value* (SV) (6)	*Net cash Flows* (NCF) (7)
0	800.00					800.00
1		–35	–104.00	0.39		–138.61
2		–35	–104.00	0.39		–138.61
3		–35	–104.00	0.39		–138.61
4		–35	–104.00	0.39		–138.61
5		–35	–104.00	0.39		–138.61
6		–35	–104.00	0.39		–138.61
7		–35	–104.00	0.39		–138.61
8		–35	–104.00	0.39	–18.00	–156.61
PV		–193*	–573.49*	+1.81**	– 6.31**	+29.01

* Depreciation tax shield (DTS) and after-tax lease rentals (ATLR) are discounted at the after-tax cost of borrowing 9.1 per cent.

** After-tax operating expenses (ATOE) and salvage value (SV) are discounted at after-tax cost of capital, 14 per cent. SV is assumed on after-tax basis.

In the example used so far, suppose the equipment manufacturer agrees to maintain the asset that would have cost the lessee firm about Rs 0.60 lakh per annum. Also, let the estimated after-tax salvage value of the equipment be Rs 18 lakh. Assume a 14 per cent after-tax cost of capital for the lessee firm. The present value (PV) of the lease will increase by:

$$\text{PV of after-tax operating cost} = \sum_{t=1}^{8} \frac{(1-0.35)0.60_t}{(1.14)_t}$$

$$= 0.39 \times 4.6389 = \text{Rs}\,1.81\,\text{lakh}$$

and decrease by

$$\text{PV of after tax salvage value} = \frac{18}{(1.14)^8}$$

$$= 18 \times 0.3506 = \text{Rs}\,6.31\,\text{lakh}$$

Thus, the net advantage of the lease will be:

$$\text{NAL} = +33.51 + 1.81 - 6.31 = \text{Rs}\,29.01$$

You may note that cash flows given in Table 4.8 include the after-tax operating expenses saved by the lessee and the salvage value foregone by him. The lease with the positive net advantage of Rs 29.01 lakh is still advantageous.

4.4.3 Internal Rate of Return Approach for Evaluating a Lease

Besides the net present value (viz., NAL) or equivalent approach, a lease can also be evaluated in terms of its internal rate of return (IRR). IRR approach finds favour with many leasing companies in practice. We can recast Equation (3) to calculate IRR of a lease:

$$\text{NAL} = A_0 - \sum_{t=1}^{n} \frac{(1-T)\,(L_t - OC_t) + \text{DTS}_t}{(1+r)^t} - \frac{\text{ATSV}_n}{(1+r)^n} = 0 \quad (4)$$

IRR of a lease is that rate which makes NAL equal to zero. Using net cash flows as given in Table 4.8, we can calculate IRR of the lease in our example as follows:

$$\begin{aligned}\text{NAL} = 800 &- \frac{138.61}{(1+r)^1} + \frac{138.61}{(1+r)^2} + \frac{138.61}{(1+r)^3} + \frac{138.61}{(1+r)^4} \\ &+ \frac{138.61}{(1+r)^5} + \frac{138.61}{(1+r)^6} + \frac{138.61}{(1+r)^7} + \frac{156.61}{(1+r)^8} \\ &= 0\end{aligned}$$

By trial and error, we find IRR, $r = 8.2$ per cent. This represents after-cost of lease financing to the lessee. It comprises after-tax lease rentals, depreciation tax lost and salvage value foregone. It also implicitly includes the loss of interest tax shield on debt displaced by leasing. Since the after-tax cost of borrowing (9.1 per cent) of the lessee in our example is more than the after-tax cost of lease financing (8.2 per cent), the lessee should go for leasing the asset rather than buying it.

4.5 DEPRECIATION TAX SHIELD AND SALVAGE VALUE UNDER INDIAN TAX LAWS

We have discussed earlier in this book that in India WDV depreciation on the block of assets is allowed for the purpose of tax. When an asset is sold from the block of assets, the firm obtains salvage value but loses depreciation tax shield on the amount of salvage value forever. Recall that depreciation tax shields are safe cash nominal flows. Hence they are discounted at the after-tax borrowing cost. On the other hand, salvage value is an uncertain cash flow; therefore, it is discounted at the firm's cost of capital. Once the firm sells an asset, it will know the salvage value on which it will lose the depreciation tax shield. Thus, lost depreciation tax shield on salvage value should be treated as safe cash flows and would be discounted at the after-tax cost of borrowing. Let us illustrate this point.

Illustration 4.1: Lease Evaluation: Indian Tax System

Surana Fasteners Limited wants to lease an equipment costing Rs 1,000 lakh for a period of seven years. The end of the year annual lease rental is Rs 240 lakh. As compared to the buy option, the company will have to provide for the maintenance, insurance, and other operating expenses associated with the use of the leased asset. The company will take a maintenance service contract for a period of seven years at a fixed annual cost of Rs 10 lakh payable in the beginning of the year. Under the buy option, the company could charge WDV depreciation at 25 per cent on the block of assets including the equipment. Under the lease option, it will have to forgo the salvage value of the equipment estimated as Rs 100 lakh at the end of seven years. Surana's opportunity cost of capital is 15 per cent and the cost of borrowing is 10 per cent. The corporate tax rate is 35 per cent.

In this case the incremental lease cash flows are as follows:

1. The company will avoid paying the purchase price of Rs 1,000 lakh in year 0.
2. The company will lose DTS forever. DTS are safe cash flows; hence, they will be discounted at the after-tax cost of borrowing. You may recall that the discounted value of a constantly declining DTS perpetuity is given as follows (T is tax rate, d depreciation rate and k_d cost of borrowing):

$$\frac{T \times d}{k_d\,(1-T) + d}$$

3. The company will pay each year after-tax lease rentals of Rs 156 lakh [(1 – 0.35) × Rs 240 lakh]. These are fixed obligations and will be discounted at the after-tax cost of borrowing of 6.50 per cent.
4. The company will incur in the beginning of each year after-tax annual operating cost of Rs 6.50 lakh [(1 – 0.35) × Rs 10 lakh]. This amount is known and it is fixed by the contract. Hence it is a safe nominal cash flow, and it should be discounted at the after-tax cost of borrowing.

NOTES

Check Your Progress

5. Under what conditions will both the lessor as well as lessee gain?

Table 4.9: Lease Evaluation: Indian Tax Laws

(Rs in lakh)

	Cash Flows	*Discount rate*	*Present Value*
Purchase price avoided, P_0	Year 0		+1,000.00
Lost DTS on equipment cost, $1000 \times \frac{0.35 \times 0.25}{0.25 + 0.065}$	Year 1 to infinity	0.065	–277.78
After-tax lease rentals, 156 × 5.4845	Year 1–7 annuity	0.065	–855.58
After-tax operating cost, 6.50 × 5.4845 × 1.065	Year 0–6 annuity due	0.065	– 37.97
Salvage value, $100 \times \frac{1}{1.15^7} = 100 \times 0.3759$	Year 7	0.15	– 37.59
DTS on salvage value, $100 \times \frac{0.35 \times 0.25}{0.25 + 0.065} \times \frac{1}{1.15^7}$	Year 7	0.065; 0.15	+ 10.44
Net advantage of leasing			–198.48

5. The company will have to forgo the equipment's salvage value of Rs 100 lakh. This amount is uncertain; therefore, it should be discounted at the company's cost of capital.

6. The loss of the salvage value will be adjusted for the present value of depreciation tax shield on the salvage value. This amount is known at the end of the seventh year. Hence the series of DTS on the salvage value *after* seventh year is known and it is a safe cash flow. Its present value at the end of the seventh year should be calculated at the after-tax cost of borrowing. Salvage value is uncertain *until the end* of the seventh year, and so is the case with DTS on salvage value. To determine the present value of DTS on salvage value occurring at the end of seventh year, it will be discounted at the firm's cost of capital.

   The values of cash flows of leasing are calculated in Table 4.9.

4.6 LEVERAGED LEASE

Under a **leveraged lease**, four parties are involved: the manufacturer of the asset, the lessor, the lender from whom the lessor borrows a substantial portion of the asset's purchase price, and the lessee. In a direct lease, the lessor buys the asset and becomes the owner by making the full payment of the asset. In a leveraged lease, the lessor makes substantial borrowing, even up to 80 per cent of the asset's purchase price. He provides the remaining amount—about 20 per cent or so—as equity to become the owner (Figure 4.1). The lessor claims all tax benefits related to the ownership of the asset. Lenders, generally the large financial institutions, provide loans on a **non-recourse** basis to the lessor. Their debt is serviced exclusively out of the lease proceeds. To secure the loan provided by lenders, the lessor also agrees to give them a mortgage on the asset. Thus, lenders have the first claim on the lease payments together with the collateral on the asset. Lenders will take charge of the asset if the lessee is unable to make lease payments.

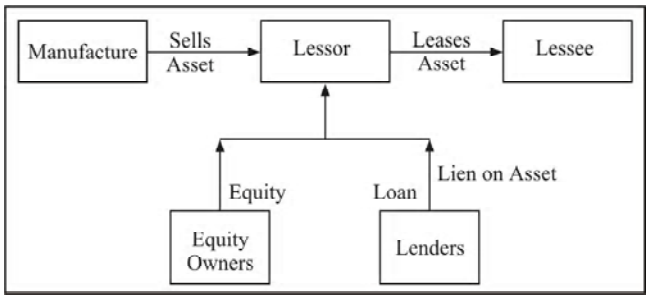


Figure 4.1: Leveraged lease

NOTES

Check Your Progress

6. While undertaking lease evaluation, what is the treatment of depreciation tax shield and salvage value under Indian Tax Laws?

NOTES

Leveraged lease are called so because the high non-recourse debt creates a high degree of leverage. The effect is to amplify the return of the equity-holder (that is, the lessor). But the risk is also quite high if the lease payments are not received. Leveraged lease is quite useful for large capital equipment with long economic life, say, 20 years or more. It is one of the popular means of financing large infrastructure projects.

4.7 LET US SUMMARIZE

- A lease is an agreement for the use of the asset for a specified rental. The owner of the asset is called the lessor and the user the lessee.
- Two important categories of leases are: operating leases and financial leases. Operating leases are short-term, cancellable leases where the risk of obsolescence is borne by the lessor. Financial leases are long-term non-cancellable leases where any risk in the use of the asset is borne by the lessee and he enjoys the returns too.
- The most compelling reason for leasing an equipment rather than buying it is the tax advantage of depreciation that can mutually benefit both the lessee and the lessor. Other advantages include convenience and flexibility as well as specialised services to the lessee.
- In India, lease proves handy to those firms, which cannot obtain loan capital from normal sources.
- Financial lease involves fixed obligations in the form of lease rentals. Thus it is like a debt and can be evaluated that way.
- Given the lease rentals and tax shields, one can find the amount of debt which these cash flows can service. This is equivalent loan. If equivalent loan is more than the cost of the asset, it is not worth leasing the equipment.
- You can also approach lease evaluation by calculating the net advantage of lease (NAL). After-tax lease rentals and tax shields may be discounted at the after-tax borrowing rate while operating costs and salvage value at the firm's cost of capital to find out NAL:

$$\text{NAL} = A_o - \sum_{t=1}^{n} \frac{(1-T)L_t + \text{TDEP}_t}{[1+i(1-T)]^t} + \sum_{t=1}^{n} \frac{(1-T)\text{OC}_t}{(1+k)^t} - \frac{\text{ATSV}_n}{(1+k)^n}$$

4.8 KEY CONCEPTS

Back-ended lease	Secondary lease	Build-lease-transfer (BLT)
Build-own-operate (BOO)	Balance sheet financing	Dry lease
Capital lease	Build-own-operate-transfer (BOOT)	Equivalent loan
Financial distress	Cross-border lease	Financial leverage
Force majeure	Financial lease	Leveraged lease
Instalment sale	Full-payout lease	Operating leverage
Moral hazard	Lease	Sale-and-lease-back
Primary lease	Up-fronted lease	Wet lease

4.9 ILLUSTRATIVE SOLVED PROBLEM

Problem 4.1: A company is considering the lease of an equipment which has a purchase price of Rs 350,000. The equipment has an estimated economic life of 5 years. As per the Income Tax Rule a written down depreciation at 25 per cent is allowed. The lease rentals per year are Rs 120,000. Assume that the company's marginal corporate tax rate is 50 per cent. If the before-tax borrowing rate for the company is 16 per cent, should the company lease the equipment? Ignore tax shield on depreciation after 5 years.

Check Your Progress

7. Which are the parties involved under a leveraged lease? How does leveraged lease differ from a direct lease?

Solution:

The table 4.14 shows the cash flow consequences of the lease and NAL (net advantage or present value of lease).

Notes:

NOTES

1. Depreciation is calculated at 25 per cent (WDV) as follows:

Year	*1*	*2*	*3*	*4*	*5*
Dep.	87,500	65,625	49,219	36,914	27,685

2. Lost tax shield on depreciation is depreciation multiplied by tax rate.
3. Salvage value is assumed to be zero.

Table 4.14: Net Present Value of Lease

Year	*0*	*1*	*2*	*3*	*4*	*5*
Purchase price avoided	350,000					
Lost depreciation tax shield	–43,750	–32,813	–24,610	–18,457	–	13,843
After-tax lease rentals		–60,000	–60,000	–60,000	–60,000	–60,000
Net cash flows	350,000	–103,750	–92,813	–84,610	–78,457	–73,843
PV at 8%	350,000	–96,073	–79,541	–67,180	–57,666	–50,287
NPV	– 747					

The net present value of lease is negative. The company may like to purchase the equipment. The purchase option would still be better if the equipment has a salvage value at the end of its economic life.

4.10 ANSWERS TO 'CHECK YOUR PROGRESS'

1. Operating leases are short-term and cancellable lease agreements. Convenience and instant services are common in operating leases. Assets such as cars, residential apartments, computers or office equipments on lease for short periods of few days to one year or so are common examples of operating leases. Basically a single operating lease contract may not fully amortise the original cost of the asset as the lease period covers a period which is considerably shorter than the useful life of the asset.
2. The lessor is the legal owner of the asset. Hence, he/she is entitled to claim depreciation as an expense and save taxes.
3. In the case of leasing, there is a contract between the lessor, the owner of the asset, and the lessee, the user of the asset. The lessee pays the lessor a lease rental for using the asset, and the lessor, being the owner of the asset not only earns the lease rental payable but also claims depreciation. The lessee can charge the lease rental to his profit and loss account.
4. While evaluating the economic viability of an asset as an investment, the first step is to calculate whether the asset has a positive net present value. Once it has been decided to go ahead with acquiring the asset, the firm will need to compare the costs of financing the asset through leasing with that of normal sources of financing. In order to arrive at net present values while evaluating a financial lease, usually the after-tax borrowing rate is considered instead of the cost of capital of the firm. This is because leasing is similar to a secured debt.
5. In the case of leasing, the lessor takes credit for depreciation, and takes advantage of the depreciation tax shield. Leasing can be made beneficial to both lessor and lessee if the lessor

NOTES

passes on to the lessee a part of the depreciation tax shield that he has gained in the form of reduced lease rentals. Both gain at the government's expense because of the differences in their tax rates.

6. In India depreciation can be charged using the written down value (WDV) method. While calculating incremental lease cash flows, the lessee company will lose depreciation tax shield (DTS) forever. DTS are safe cash flows and hence they should be discounted at the after-tax cost of borrowing. On the other hand, the equipment's salvage value is uncertain, and therefore it should be discounted at the company's cost of capital.
7. The four parties involved in a leveraged lease are the manufacturer of the asset, the lessor, the lender from whom the lessor borrows funds to finance the asset's acquisition, and the lessee. In a direct lease, the lessor buys the asset and becomes the owner by making full payment of the asset from his own funds. On the other hand, in a leveraged lease, the lessor makes substantial borrowing, up to 80 per cent of the asset's purchase price, in order to finance the leased asset.

4.11 QUESTIONS AND EXERCISES

Review Questions

1. Define a lease. How does it differ from a hire purchase and instalment sale? What are the cash flow consequences of a lease? Illustrate.
2. What are the myths and advantages of a lease?
3. Explain and illustrate the equipment loan method of lease evaluation.
4. What is net advantage of a lease? How is it calculated?
5. What is the difference between equivalent loan and net advantage of lease methods of the lease evaluation?
6. "It makes sense for companies that pay no taxes to lease from companies that do." Explain.
7. What is a leveraged lease? What are its merits and demerits?
8. What is the hire purchase financing? How does it differ from the lease financing?

Exercises

1. A company wants to lease a Rs 10 lakh equipment. The lessor requires eight annual end-of-the-year lease payments of Rs 1,75,000. The company's marginal tax rate is 35 per cent. If it buys the equipment, it can write-off the written-down cost of asset at 25 per cent. The company's borrowing rate is 15 per cent. Should the company lease the equipment? Use equivalent loan method to answer the question.
2. A cement manufacturer is considering to lease a drying equipment which is worth Rs 75 lakh. It will have to pay five annual beginning-of-the-year lease rentals of Rs 20 lakh. The tax rate is 35 per cent and the manufacturer can write-off the cost of equipment at 25 per cent written down basis for 5 years. The manufacturer's effective borrowing rate is 16 per cent. Should the equipment be leased? Show that equivalent loan method and net advantage of lease method will lead to the same answer.
3. Readymade Garments Limited wants to lease a computer system for the purpose of colour matching. The system will cost Rs 30 lakh, and if bought can be depreciated over its life of 5 years. The annual rentals, payable at the end of year for 5 years, will be Rs 8.4 lakh. The applicable written-down depreciation rate is 25 per cent. The lessor will maintain the computer system at its cost which works out to be Rs 50,000 per year. At the end of its useful life, the system can be sold for 50 per cent of its depreciated value. The company's borrowing rate is 14 per cent and tax rate is 35 per cent. Should the system be leased? Show your calculations.
4. A firm proposes to lease an asset of Rs 20 lakh. The annual, end of the year, lease rentals will be Rs 5 lakh for 5 years. The firm is not in a position to pay tax for next 5 years. The depreciation rate (WDV) is 25 per cent per annum. The lessor's marginal tax rate is 35 per

cent. Calculate the net present value of lease to the lessee and the lessor. What are the break-even rentals to the lessee and the lessor? How can both benefit from the deal? Show your computations. Assume that the lessee's post-tax borrowing rate is 14 per cent.

5. You are planning to buy or lease an IBM notebook. It will cost you Rs 1,50,000. You can lease it for 8 years for Rs 2,500 per month payable in the beginning of the month. As per the tax rules, you can neither claim depreciation nor deduct interest on your personal borrowings from your income. Your friend is willing to lend you Rs 1,50,000 at 10 per cent per annum. Should you lease the notebook or borrow from your friend and buy it?

6. A company is considering whether it should buy or lease an equipment that costs Rs 80 lakh. A finance company has offered to lease the equipment for 5 years at annual lease payments Rs 20 lakh at the beginning of each year. The owner of the equipment can claim depreciation on written-down basis at 25 per cent each year. The company's (lessee's) tax rate is 35 per cent, and its cost of borrowing is 14 per cent, and the cost of capital is 16 per cent.

   (*a*) Should the company buy the asset or lease it?

   (*b*) What would your answer be if (*a*) we assume that the equipment has a salvage value of Rs 10 lakh at the end of its life, and that the lessor will maintain the equipment which would otherwise cost the lessee Rs 1 lakh each year? (*b*) Instead of lease the company goes for a hire purchase, how much maximum hire-purchase instalment should it be prepared to pay each year?

NOTES

MODULE - 2

UNIT 5 CAPITAL STRUCTURE THEORY AND POLICY

NOTES

Structure

5.0 INTRODUCTION

Under favourable economic conditions, the earnings per share increase with financial leverage. But leverage also increases the financial risk of shareholders. As a result, it cannot be stated definitely whether or not the firm's value will increase with leverage. The objective of a firm should be directed towards the maximisation of the firm's value. The capital structure or financial leverage decision should be examined from the point of its impact on the value of the firm. If capital structure decision can affect a firm's value, then it would like to have a capital structure, which maximises its market value. However, there exist conflicting theories on the relationship between capital structure and the value of a firm. The traditionalists believe that capital structure affects the firm's value while Modigliani and Miller (MM), under the assumptions of perfect capital markets and no taxes, argue that capital structure decision is irrelevant. MM reverse their position when they consider corporate taxes. Tax savings resulting from interest paid on debt

creates value for the firm. However, the tax advantage of debt is reduced by personal taxes and financial distress. Hence, the trade-off between costs and benefits of debt can turn capital structure into a relevant decision. There are other views also on the relevance of capital structure. We first discuss the traditional theory of capital structure followed by MM and other views.

NOTES

5.1 UNIT OBJECTIVES

- Understand the theories of the relationship between capital structure and the value of the firm
- Highlight the differences between the Modigliani-Miller view and the traditional view on the relationship between capital structure and the cost of capital and the value of the firm
- Focus on the interest tax shield advantage of debt as well as its disadvantage in terms of costs of financial distress

5.2 ASSUMPTIONS OF TRADITIONAL CAPITAL STRUCTURE THEORIES

In order to grasp the elements of the capital structure and the value of the firm or the cost of capital controversy properly, we make the following assumptions:[1]

- Firms employ only two types of capital: debt and equity.
- The total assets of the firm are given. The degree of leverage can be changed by selling debt to repurchase shares or selling shares to retire debt.[2]
- Investors have the same subjective probability distributions of expected future operating earnings for a given firm.
- The firm has a policy of paying 100 per cent dividends.
- The operating earnings of the firm are not expected to grow.
- the business risk is assumed to be constant and independent of capital structure and financial risk.
- The corporate and personal income taxes do not exist. This assumption is relaxed later on.

5.3 RELEVANCE OF CAPITAL STRUCTURE: THE NET INCOME AND THE TRADITIONAL VIEWS

There are several variations of the traditional theory. But the thrust of all views is that capital structure matters. One earlier version of the view that capital structure is relevant is the **net income (NI) approach.**[3] We first discuss the NI approach, followed by other traditional views.

5.3.1 The Net Income Approach

A firm that finances its assets by equity and debt is called a **levered firm**. On the other hand, a firm that uses no debt and finances its assets entirely by equity is called an **unlevered firm**.

1. See Van Horne, J.C., *Financial Management and Policy*, Prentice-Hall of India, 1985, p. 244.
2. In India, a company cannot repurchase its own shares. This assumption is made to simplify the discussion on the capital structure controversy. There is, however, a proposal to allow repurchase of shares by companies in India under government's consideration.
3. Durand, David, "Costs of Debt and Equity Funds for Business: Trends and Problems of Measurement", reprinted in *The Management of Corporate Capital*, Ezra Solomon (ed.), The Free Press, 1959, pp. 91–16.

Suppose firm *L* is a levered firm and it has financed its assets by equity and debt. It has perpetual expected EBIT or net operating income (NOI) of Rs 1,000 and the interest payment of Rs 300. The firm's cost of equity (or equity capitalisation rate), k_e, is 9.33 per cent and the cost of debt, k_d, is 6 per cent. What is the firm's value? The value of the firm is the sum of the values of all of its securities. In this case, firm *L*'s securities include equity and debt; therefore the sum of the values of equity and debt is the firm's value. The value of a firm's shares (equity), *E*, is the discounted value of shareholders' earnings, called **net income**, NI. Firm's *L*'s net income is: NOI – interest = 1,000 – 300 = Rs 700, and the cost of equity is 9.33 per cent. Hence the value of *L*'s equity is: 700/0.0933 = Rs 7,500:

$$\text{Value of equity} = \text{discounted value of net income}$$

$$E = \frac{\text{Net Income}}{\text{Cost of equity}} = \frac{\text{NI}}{k_e} = \frac{700}{0.0933} = \text{Rs } 7{,}500 \quad (1)$$

Similarly the value of a firm's debt is the discounted value of debt-holders' interest income. The value of *L*'s debt is: 300/0.06 = Rs 5,000:

$$\text{Value of debt} = \text{discounted value of interest}$$

$$D = \frac{\text{Interest}}{\text{Cost of debt}} = \frac{\text{INT}}{k_d} = \frac{300}{0.06} = \text{Rs } 5{,}000 \quad (2)$$

The value of firm *L* is the sum of the value of equity and the value of debt: 7,500 + 5,000 = Rs 12,500:

$$\text{Value of the firm} = \text{value of equity} + \text{value of debt}$$

$$V = E + D = 7{,}500 + 5{,}000 = \text{Rs } 12{,}500 \quad (3)$$

Firm's *L*'s value is Rs 12,500 and its expected net operating income is Rs 1,000. Therefore, the firm's overall expected rate of return or the cost of capital is: 1,000/12,500 = 0.08 or 8 per cent:

$$\text{Firm's cost of capital} = \frac{\text{Net operating income}}{\text{Value of the firm}}$$

$$k_o = \frac{\text{NOI}}{V} = \frac{1{,}000}{12{,}500} = 0.08 \text{ or } 8\% \quad (4)$$

The firm's overall cost of capital is the **weighted average cost of capital** (WACC). There is an alternative way of calculating WACC (k_o). WACC is the weighted average of costs of all of the firm's securities. Firm *L*'s securities include debt and equity. Therefore, firm *L*'s WACC or k_o, is the weighted average of the cost of equity and the cost of debt. Firm *L*'s value is Rs 12,500, value of its equity is Rs 7,500 and value of its debt is Rs 5,000. Hence, the firm's debt ratio (*D/V*) is: 5,000/12,500 = 0.40 or 40 per cent, and the equity ratio (*E/V*) is: 7,500/12,500 = 0.60 or 60 per cent. Firm *L*'s weighted average cost of capital is:

$$\text{WACC} = \text{cost of equity} \times \text{equity weight} + \text{cost of debt} \times \text{debt weight}$$

$$k_o = k_e \times \frac{E}{V} + k_d \times \frac{D}{V}$$

$$k_o = 0.0933 \times \frac{7{,}500}{12{,}500} + 0.06 \times \frac{5{,}000}{12{,}500}$$

$$k_o = 0.0933 \times 0.60 + 0.06 \times 0.40$$

$$= 0.056 + 0.025 = 0.08 \text{ or } 8\% \quad (5)$$

Suppose firm *L* operates in a *frictionless* world. There are no taxes and transaction costs and debt is risk-free and shareholders perceive no financial risk arising from the use of debt. Under these conditions, the cost of equity, k_e, and the cost of debt, k_d, will remain constant with financial leverage. Since debt is a cheaper source of finance than equity, the firm's weighted average cost of capital will reduce with financial leverage. Suppose firm *L*'s substitutes debt for equity and raises its debt ratio to 90 per cent. Its WACC will be: 0.0933 × 0.10 + 0.06 × 0.90 = 0.0633 or 6.33 per cent. Firm *L*'s WACC will be 6 per cent if it employs 100 per cent debt.

NOTES

Rearranging Equation (5), we get

$$\text{WACC} = k_o = k_e \times \left(1 - \frac{D}{V}\right) + k_d \times \frac{D}{V}$$

$$\text{WACC} = k_o = k_e - (k_e - k_d)\frac{D}{V} \quad (6)$$

You may note from Equation (6) that, given constant cost of equity, k_e, and cost of debt, k_d, and k_d less than k_e, the weighted average cost of capital, k_o, will decrease continuously with financial leverage, measured by D/V. You may also notice that k_o equals the cost of equity, k_e, minus the spread between the cost of equity and the cost of debt times D/V. WACC, k_o, will be equal to the cost of equity, k_e, if the firm does not employ any debt (i.e. $D/V = 0$), and k_o, will approach k_d, as D/V approaches one (or 100 per cent).

Under the assumption that k_e and k_d remain constant, the value of the firm will be:

$$V = E + D = \frac{\text{NOI} - \text{INT}}{k_e} + \frac{\text{INT}}{k_d}$$

$$= \frac{\text{NOI} - k_d D}{k_e} + \frac{k_d D}{k_d} = \frac{\text{NOI} - k_d D}{k_e} + D = \frac{\text{NOI}}{k_e} + D - \frac{k_d D}{k_e}$$

$$V = \frac{\text{NOI}}{k_e} + D\left(1 - \frac{k_d}{k_e}\right) \quad (7)$$

You may notice that for an unlevered firm, the second term on the right-hand side of Equation (7) will be zero. The unlevered firm's cost of equity is also its WACC and its expected net operating income is its expected net income. Hence, the value of an unlevered (an all-equity) firm is the discounted value of the net operating income. You may also notice from Equation (7) that as the firm substitutes debt for equity and so long as k_e and k_d are constant, the value of the firm V increases by debt multiplied by a constant rate, $(k_e - k_d)/k_e$.

Illustration 5.1: Firm Value Under Net Income Approach

Suppose that a firm has no debt in its capital structure. It has an expected annual net operating income of Rs 100,000 and the equity capitalisation rate, k_e, of 10 per cent. Since the firm is 100 per cent equity financed firm, its weighted cost of capital equals its cost of equity, *i.e.*, 10 per cent. The value of the firm will be: 100,000 ÷ 0.10 = Rs 1,000,000.

Let us assume that the firm is able to change its capital structure replacing equity by debt of Rs 300,000. The cost of debt is 5 per cent. Interest payable to debt-holders is: Rs 300,000 × 0.05 = Rs 15,000. The net income available to equity holders is: Rs 100,000 – Rs 15,000 = Rs 85,000.

The value of the firm is equal to the sum of values of all securities:

$$E = \frac{\text{NOI} - \text{interest}}{k_e} = \frac{\text{NI}}{k_e} = \frac{85{,}000}{0.10} = \text{Rs } 850{,}000$$

$$D = \frac{\text{Interest}}{k_d} = \frac{15{,}000}{0.05} = \text{Rs } 300{,}000$$

$$V = E + D = 850{,}000 + 300{,}000 = \text{Rs } 1{,}150{,}000$$

You can also calculate the value of the firm as follows:

$$V = \frac{100{,}000}{0.10} + 300{,}000\left(1 - \frac{0.05}{0.10}\right) = 1{,}000{,}000 + 150{,}000 = \text{Rs } 1{,}150{,}000$$

The weighted average cost of capital, k_o, is:

$$k_o = \frac{\text{NOI}}{V} = \frac{1{,}00{,}000}{1{,}150{,}000} = 0.087 \text{ or } 8.7 \text{ per cent}$$

$$k_o = k_d \frac{D}{V} + k_e \frac{S}{V} = 0.05\left(\frac{300{,}000}{1{,}150{,}000}\right) + 0.10\left(\frac{8{,}50{,}000}{1{,}150{,}000}\right) = 0.013 + 0.074 = 0.087 \text{ or } 8.7 \text{ per cent}$$

Table 5.1 shows the calculations of the firm's value and weighted average cost of capital.

Suppose the firm uses more debt in place of equity and increases debt to Rs 900,000. As shown in Table 5.1, the firm's value increases to Rs 1,450,000, and the weighted average cost of capital reduces to 8.1 per cent. Thus, by increasing debt, the firm is able to increase the value of the firm and lower WACC.

Table 5.1: Value of the Firm (NI Approach)

	Zero debt	*5% Rs 300,000 debt*	*5% Rs 900,000 debt*
Net operating income, NOI	100,000	100,000	100,000
Total cost of debt, INT = k_dD	0	15,000	45,000
Net income, NI: NOI – INT	100,000	85,000	55,000
Market value of equity, E: NI/k_e	1,000,000	850,000	550,000
Market value of debt, D: INT/k_d	0	300,000	900,000
Market value of the firm, $V = E + D$ = NOI/k_o	1,000,000	1,150,000	1,450,000
Debt/Total value, D/V	0.00	0.261	0.62
WACC, NOI ÷ V = $k_e \times E/V + k_d \times D/V$	0.100	0.087	0.081

We construct Table 5.2 to show the effect of financial leverage on the value of the firm and WACC under the NI approach. It is assumed that the net operating income is Rs 100,000 and the debt-capitalisation rate and the equity-capitalisation rate respectively are 5 per cent and 10 per cent, and they remain constant with debt. It is noticeable from the table that the value of the firm increases steadily as the debt ratio, D/V, increases and WACC declines continuously, ultimately reducing to 5 per cent at 100 per cent debt ratio.

Figure 5.1 plots WACC as a function of financial leverage. Financial leverage, D/V, is plotted along the horizontal axis and WACC, k_o, and the cost of equity, k_e, and the cost of debt, k_d, on the vertical axis. You may notice from Figure 5.1 that, under NI approach, k_e and k_d are constant. As debt is replaced for equity in the capital structure, being less expensive, it causes weighted average cost of capital, k_o, to decrease that ultimately approaches the cost of debt with 100 per cent debt ratio (D/V). The optimum capital structure occurs at the point of minimum WACC. Under the NI approach, the firm will have the maximum value and minimum WACC when it is 100 per cent debt-financed.

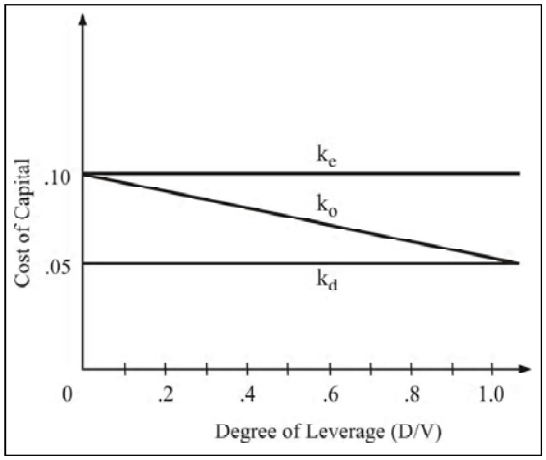


Figure. 5.1: The effect of leverage on the cost of capital under NI approach

NOTES

NOTES

Table 5.2: Effect of Leverage on Value and Cost of Capital under NI Approach

Leverage (D/V) %	*0.00*	*18.18*	*33.34*	*46.15*	*66.67*	*94.74*	*100*
NOI	Rs 100	Rs 100	Rs 100	Rs 100	Rs 100	Rs 100	Rs 100
Interest, INT	–	10	20	30	50	90	100
NI = NOI – INT	Rs 100	Rs 90	Rs 80	Rs 70	Rs 50	Rs 10	Rs 0
k_d (%)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
k_e (%)	10.0	10.0	10.0	10.0	10.0	10.0	10.0
k_0 (%)	10.0	9.1	8.3	7.7	6.7	5.3	5.0
E = (NOI– INT)/k_e	Rs 1,000	Rs 900	Rs 800	Rs 700	Rs 500	Rs 100	Rs 0
D = INT/k_d	0	200	400	600	1,000	1,800	2,000
$V = E + D$	Rs 1,000	Rs 1,100	Rs 1,200	Rs 1,300	Rs 1,500	Rs 1,900	Rs 2,000

5.3.2 The Traditional View

The **traditional view**[4] has emerged as a compromise to the extreme position taken by the NI approach. Like the NI approach, it does not assume constant cost of equity with financial leverage and continuously declining WACC. According to this view, a judicious mix of debt and equity capital can increase the value of the firm by reducing the weighted average cost of capital (WACC or k_0) up to certain level of debt. This approach very clearly implies that WACC decreases only within the reasonable limit of financial leverage and reaching the minimum level, it starts increasing with financial leverage. Hence, a firm has an optimum capital structure that occurs when WACC is minimum, and thereby maximising the value of the firm. Why does WACC decline? WACC declines with moderate level of leverage since low-cost debt is replaced for expensive equity capital. Financial leverage, resulting in risk to shareholders, will cause the cost of equity to increase. But the traditional theory assumes that at moderate level of leverage, the increase in the cost of equity is more than offset by the lower cost of debt. The assertion that debt funds are cheaper than equity funds carries the clear implication that the cost of debt plus the increased cost of equity, together on a weighted basis, will be less than the cost of equity that existed on equity before debt financing.[5] For example, suppose that the cost of capital for totally equity-financed firm is 12 per cent. Since the firm is financed only by equity, 12 per cent is also the firm's cost of equity (k_e). The firm replaces, say, 40 per cent equity by debt bearing 8 per cent rate of interest (cost of debt, k_d). According to the traditional theory, the financial risk caused by the introduction of debt may increase the cost of equity slightly, but not so much that the advantage of cheaper debt is taken off totally. Assume that the cost of equity increases to 13 per cent. The firm's WACC will be:

$$\text{WACC} = \text{cost of equity} \times \text{weight of equity} + \text{cost of debt} \times \text{weight of debt}$$

$$\text{WACC} = k_o = k_e \times w_e + k_d \times w_d$$
$$= 0.13 \times 0.6 + 0.08 \times 0.4 = 0.078 + 0.032 = 0.11 \text{ or } 11\%$$

Thus, WACC will decrease with the use of debt. But as leverage increases further, shareholders start expecting higher risk premium in the form of increasing cost of equity until a point is reached at which the advantage of lower-cost debt is more than offset by more expensive equity. Let us consider an example as given in Illustration 5.2.

Illustration 5.2: The Traditional Theory of Capital Structure

Suppose a firm is expecting a perpetual net operating income of Rs 150 crore on assets of Rs 1,500 crore, which are entirely financed by equity. The firm's equity capitalisation rate (the cost of equity) is 10 per cent. It is considering substituting equity capital by issuing perpetual debentures of Rs 300 crore at 6 per

4. Solomon, Ezra, *The Theory of Financial Management*, University Press, 1963, p. 92.
5. Barges, A., *The Effect of Capital Structure on the Cost of Capital*, Prentice-Hall, Inc., 1963, p. 11.

cent interest rate. The cost of equity is expected to increase to 10.56 per cent. The firm is also considering the alternative of raising perpetual debentures of Rs 600 crore and replace equity. The debt-holders will charge interest of 7 per cent, and the cost of equity will rise to 12.5 per cent to compensate shareholders for higher financial risk.

Notice that at higher level of debt (Rs 600 crore), both the cost of equity and cost of debt increase more than at lower level of debt. The calculations for the value of the firm, the value of equity and WACC are shown in Table 5.3.

Table 5.3: Market Value and the Cost of Capital of the Firm (Traditional Approach)

	No Debt ***(Rs in crore)***	***6% Debt*** ***(Rs in crore)***	***7% Debt*** ***(Rs in crore)***
Net operating income, NOI	150	150	150
Total cost of debt, INT = k_d D	0	18	42
Net income, NOI– INT	150	132	108
Cost of equity, k_e	0.1000	0.1056	0.1250
Market value of equity, E = (NOI– INT)/ k_e	1,500	1,250	864
Market value of debt, D	0	300	600
Total value of firm, $V = E + D$	1,500	1,550	1,464
Equity-to-total value, $w_e = E/V$	1.00	0.806	0.590
Debt-to-total value, $w_d = D/V$	0.00	0.194	0.410
WACC, k_o = NOI/V $= k_e \times w_e + k_d \times w_d$	0.1000	0.0970	0.1030

When the firm has no debt, WACC and the cost of equity are the same (10 per cent). We assume that the expected net operating income, the net income and interest are perpetual flows. We also assume that the expected net income is distributed entirely to shareholders. Therefore, the value of equity is:

$$\text{Value of equity} = \frac{\text{Net income}}{\text{Cost of equity}} = E = \frac{\text{NI}}{k_e}$$

The value of debt is interest income to debt-holders divided by the cost of debt:

$$\text{Value of debt} = \frac{\text{Interest income}}{\text{Cost of debt}} = D = \frac{\text{INT}}{k_d}$$

The sum of values of debt and equity is the firm's total value, and is directly given by net operating income divided by WACC:

$$\text{Value of firm} = \frac{\text{Net operating income}}{\text{WACC}} = S + D = \frac{\text{NOI}}{k_o}$$

You may notice from the above discussion that, according to the traditional theory, the value of the firm may first increase with moderate leverage, reach the maximum value and then start declining with higher leverage. This is so because WACC first decreases and after reaching the minimum, it starts increasing with leverage. Thus, the traditional theory on the relationship between capital structure and the firm value has three stages.[6]

First Stage: Increasing Value

In the first stage, the cost of equity, k_e, the rate at which the shareholders capitalise their net income, either remains constant or rises slightly with debt. The cost of equity does not increase fast enough to offset the advantage of low-cost debt. During this stage, the cost of debt, k_d,

6. Solomon, *op.cit.*, p. 94, Brigham, Eugene F. and Roman E. Johnson, (eds.), *Issue in Managerial Finance*, Dryden Press, 1976, p. 256.

NOTES

remains constant since the market views the use of debt as a reasonable policy. As a result, the overall cost of capital, WACC or k_o, decreases with increasing leverage, and thus, the total value of the firm, V, also increases.

Second Stage: Optimum Value

Once the firm has reached a certain degree of leverage, increases in leverage have a negligible effect on WACC and hence, on the value of the firm. This is so because the increase in the cost of equity due to the added financial risk just offsets the advantage of low cost debt. Within that range or at the specific point, WACC will be minimum, and the maximum value of the firm will be obtained.

Third Stage: Declining Value

Beyond the acceptable limit of leverage, the value of the firm decreases with leverage as WACC increases with leverage. This happens because investors perceive a high degree of financial risk and demand a higher equity-capitalisation rate, which exceeds the advantage of low-cost debt.

The overall effect of these three stages is to suggest that the cost of capital (WACC) is a function of leverage. It first declines with leverage and after reaching a minimum point or range starts rising. The relation between costs of capital and leverage is graphically shown in Figure 5.2 wherein the overall cost of capital curve, k_o, is saucer-shaped with a horizontal range. This implies that there is a range of capital structures in which the cost of capital is minimised. k_e, is assumed to increase slightly in the beginning and then at a faster rate. In Figure 5.3 the cost of capital curve is shown as U-shaped. The U-shaped cost of capital implies that there is a precise point at which the cost of capital is minimum. This precise point defines the optimum capital structure.

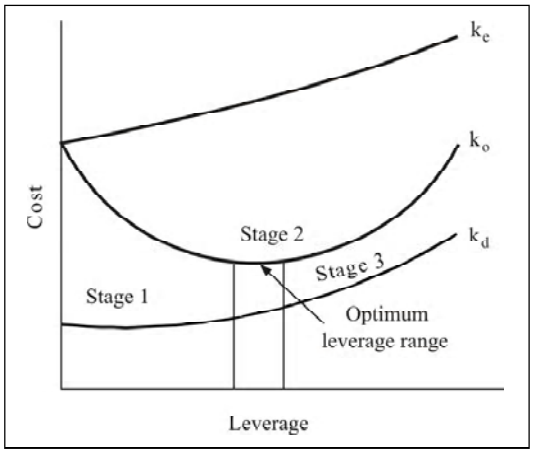


Figure 5.2: The cost of capital (saucer-shaped)

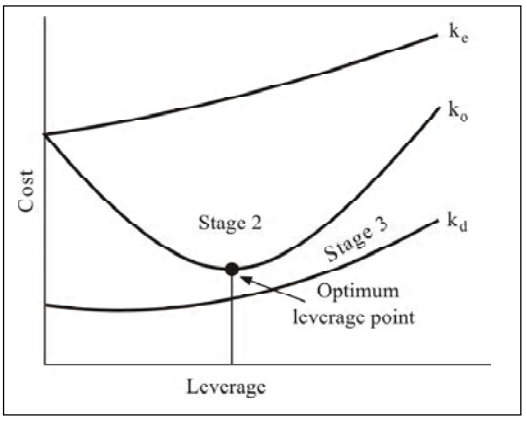


Figure 5.3: The cost of capital (U-shaped)

NOTES

As stated earlier, many variations of the traditional view exist (Figures 5.2 and 5.3). Whether the cost of equity function is horizontal or rising slightly is not very pertinent from the theoretical point of view, as a number of different costs of equity curves can be consistent with a declining average cost of capital curve. The relevant issue is whether or not the average cost of capital curve declines at all as debt is used.[7] All supporters of the traditional view agree that the cost of capital declines with debt.

5.3.3 Criticism of the Traditional View

The traditional theory implies that investors value levered firms more than unlevered firm. This means that they pay a premium for the shares of levered firms. The contention of the traditional theory that moderate amount of debt in 'sound' firms does not really add very much to the 'riskiness' of the shares is not defensible. There does not exist sufficient justification for the assumption that investors' perception about risk of leverage is different at different levels of leverage. However, as we shall explain later, the existence of an optimum capital structure can be supported on two counts: the tax deductibility of interest charges and other market imperfections.

5.4 IRRELEVANCE OF CAPITAL STRUCTURE: NOI APPROACH AND THE MM HYPOTHESIS WITHOUT TAXES

Modigliani and Miller (MM) do not agree with the traditional view.[8] They argue that, in perfect capital markets without taxes and transaction costs, a firm's market value and the cost of capital remain invariant to the capital structure changes. The value of the firm depends on the earnings and risk of its assets (business risk) rather than the way in which assets have been financed. The MM hypotheses can be best explained in terms of their two propositions.

Proposition I

Consider two pharmaceutical firms, Ultrafine and Lifeline, which have identical assets, operate in same market segments and have equal market share. These two firms belong to the same industry and they face similar competitive and business conditions. Hence, they are expected to have same net operating income and exposed to similar business risk. Since the two firms have identical business risk, it is logical to conclude that investors' expected rates of return from assets, k_a or the opportunity cost of capital of the two firms would be identical. Suppose both firms are totally equity financed and both have assets of Rs 225 crore each. Both expect to generate net operating income of Rs 45 crore each perpetually. Further, suppose the opportunity cost of capital or the capitalisation rate for both firms is 15 per cent. Let us assume that there are no taxes so that the before- and after-tax net operating income is the same. Capitalising NOI (Rs 45 crore) by the opportunity cost of capital (15 per cent), you can find the value of the firms. The two firms would have the same value: 45/0.15 = Rs 300 crore.

Let us now change the assumption regarding the financing. Suppose Ultrafine is an unlevered firm with 100 per cent equity and Lifeline a levered firm with 50 per cent equity and 50 per cent debt. Should the market values of two firms differ? Debt will not change the earnings potential of Lifeline as it depends on its investment in assets. Debt also cannot affect the business conditions and therefore, the business (operating) risk of Lifeline — the levered firm. You know that the value of a firm depends upon its expected net operating income and the overall capitalisation rate or the opportunity cost of capital. Since the form of financing (debt or equity) can neither change the firm's net operating income nor its operating risk, the values of levered and unlevered firms ought be the same. Financing changes the way in which the net operating income is distributed between equity

Check Your Progress

1. Distinguish between a levered firm and an unlevered firm.
2. How do we calculate the value of the firm under the net income approach?
3. How do we calculate a firm's overall cost of capital?
4. Under what conditions, will the cost of debt and the cost of equity remain the same with financial leverage?
5. Briefly explain the traditional view while discussing capital structure.

7. Barges, *op. cit.*, p. 12.
8. Modigliani, H., and Miller, M.H., The Cost Capital, Corporation Finance and The Theory of Investment, *American Economic Review,* 48 (June 1958), pp. 261–97.

NOTES

holders and debt-holders. Firms with identical net operating income and business (operating) risk, but differing capital structure, should have same total value. *MM*'s Proposition I is that, for firms in the same risk class, the total market value is independent of the debt-equity mix and is given by capitalising the expected net operating income by the capitalisation rate (i.e., the opportunity cost of capital) appropriate to that risk class:[9]

$$\text{Value of levered firm} = \text{Value of unleverd firm}$$

$$V_1 = V_u$$

$$\text{Value of the firm} = \frac{\text{Net operating income}}{\text{Firm's opportunity cost of capital}}$$

$$V = V_1 = V_u = \frac{\text{NOI}}{k_d} \tag{8}$$

where V is the market value of the firm and it is sum of the value of equity, E and the value of debt, D; NOI = EBIT = $\overline{X}$ the expected net operating income; and k_a = the firm's opportunity cost of capital or the capitalisation rate appropriate to the risk class of the firm.

MM's approach is a **net operating income approach** because the value of the firm is the capitalised value of net operating income. Both net operating income and the firm's opportunity cost of capital are assumed to be constant with regard to the level of financial leverage. For a levered firm, the expected net operating income is sum of the income of shareholders and the income of debt-holders. Debt-holders' income is interest and shareholders' income, called net income, is the expected net operating income less interest. The levered firm's value is the sum of the value of equity and value of debt. The levered firm's expected rate of return is the ratio of the expected operating income to the value of all its securities. This is an average expected rate of return that the levered firm's all security-holders would require the firm to earn on total investments. The average rate of return required by all security-holders in a levered firm is the firm's weighted average cost of capital; i.e., WACC = k_o or k_l . Thus

$$V_1 = \frac{\text{NOI}}{k_l = k_o}$$

$$k_o = k_l = \frac{\text{NOI}}{V_l} \tag{9}$$

In the case of an unlevered firm, the entire net operating income is the shareholders net income. Therefore, the unlevered firm's WACC or k_u is equal to its opportunity cost of capital:

$$k_a = k_u = \frac{\text{NOI}}{V_u} \tag{10}$$

Figure 5.4: The cost of capital under M–M proposition I

9. *Ibit.*, p. 266.

Since the values of the levered and unlevered firms and the expected net operating income (NOI) do not change with financial leverage, the weighted average cost of capital would also not change with financial leverage. Hence, MM's Proposition I also implies that the weighted average cost of capital for two identical firms, one levered and another unlevered, will be equal to the opportunity cost of capital (Figure 5.1):

$$\text{Levered firm's cost of capital } (k_1) = \text{Unlevered firm's cost of capital } (k_u)$$

$$k_1 = k_o = k_a = k_u$$

5.4.1 Arbitrage Process

Why should MM's Proposition I work? As stated earlier, the simple logic of Proposition I is that two firms with identical assets, irrespective of how these assets have been financed, cannot command different market values. Suppose this were not true and two identical firms, except for their capital structures, have different market values. In this situation, **arbitrage** (or **switching**) will take place to enable investors to engage in the **personal** or **homemade leverage** as against the **corporate leverage** to restore equilibrium in the market. Consider the following example.

Illustration 5.3: The MM Proposition I and Arbitrage

Suppose two firms - Firm *U*, an unlevered firm and Firm *L*, a levered firm - have identical assets and expected net operating income (NOI = $\overline{X}$) of Rs 10,000. The value of Firm *U* is Rs 100,000 assuming the cost of equity of 10 per cent under the traditional view. Since Firm *U* has no debt, the value of its equity is equal to its total value ($E_u = V_u$). Firm *L* employs 6 per cent Rs 50,000 debt. Suppose its cost of equity under the traditional view is 11.7 per cent. Thus, the value of Firm *L*'s equity shares (E_1) is Rs 60,000, and its total value (V_1) firm is Rs 110,000 ($V_1 = E_1 + D_1 = 60,000 + 50,000$).

Table 5.4: Value of Levered and Unlevered Firms

	Firm U (Unlevered)	***Firm L (Levered)***
Net operating income, $\overline{X}$	10,000	10,000
Interest, INT	0	3,000
Net income (dividends), $\overline{X}$ – INT	10,000	7,000
Cost of equity, k_e (traditional view)	0.100	0.117
Market value of equity, *E*	100,000	60,000
Market value of debt, *D*	0	50,000
Market value of firm, $V = E + D$	100,000	110,000
WACC, k_o (traditional view)	0.10	0.091

You may notice that Firm *L* and Firm *U* have identical assets and NOI, but they have different market prices. The cheaper debt of Rs 50,000 of Firm *L* has increased shareholders wealth by Rs 10,000. MM argue that this situation cannot continue for long, as **arbitrage** will bring two prices into equilibrium. How does arbitrage work?

Assume that you hold 10 per cent shares of the levered firm *L*. What is your return from your investment in the shares of firm *L*? Since you own 10 per cent of *L*'s shares, your equity investment is: $0.10 \times (110,000 - 50,000) = \text{Rs } 6,000$. You also 'own' 10 per cent of *L*'s corporate debt: $0.10 \times 50,000 = \text{Rs } 5,000$. You are entitled to 10 per cent of the equity income (dividends):

$$\begin{aligned}\text{Return} &= 0.10(\overline{X} - \text{INT}) \\ &= 0.10(10,000) - 0.06 \times 50,000) \\ &= 0.10\,(10,000 - 3,000) = \text{Rs } 700\end{aligned}$$

You can earn same return at lesser investment through an alternate investment strategy. This you can do by switching your investment from firm *L* and firm *U* as follows:

1. Selling your investment in firm *L*'s shares for Rs 6,000.

NOTES

2. Borrowing on your *personal account* an amount equal to your share of firm *L*'s corporate debt at 6 per cent rate of interest: 0.10 (50,000) = Rs 5,000.
3. Buying 10 per cent of the unlevered firm *U*'s shares investing: 0.10 × 100,000 = Rs 10,000.

You have Rs 11,000 with you; that is, Rs 6,000 from sale of *L*'s shares and Rs 5,000 borrowed funds. Your investment in *U*'s shares is Rs 10,000. Thus, you have surplus cash of Rs 1,000.

Your return from *U* is:

$$\text{Return from investment in } U\text{'s share} = 0.10 \times 10{,}000 = \text{Rs } 1{,}000$$

However, you have borrowed Rs 5,000 at 6 per cent. Therefore, you will have to pay an interest of Rs 300:

$$\text{Interest payable on borrowed funds} = 0.06 \times 5{,}000 = \text{Rs } 300$$

Thus your net return is Rs 700 = Rs 1,000 – Rs 300:

	Rs
Equity return from *U*: 0.10 × Rs 10,000	1,000
Less: Interest on personal borrowing: 0.06 × Rs 5,000	300
Net return	700

You earn the same return from the alternate strategy. But now you also have extra cash of Rs 1,000 that you can invest to enhance your return. Thus, the alternate strategy will yield higher overall return. Your risk is same in both the cases. While shifting your investment from firm *U* to firm *L*, you replaced your share of *L*'s debt by personal debt. You have created 'personal' or 'homemade leverage' instead of 'corporate leverage'.

Due to the advantage of the alternate investment strategy, a number of investors will be induced towards it. They will sell their shares in firm *L* and buy shares and debt of firm *U*. This arbitrage will tend to increase the price of firm *U*'s shares and to decline that of firm *L*'s shares. It will continue until the equilibrium price for the shares of firm *U* and firm *L* is reached.

The arbitrage would work in the opposite direction if we assume that the value of the unlevered firm *U* is greater than the value of the levered firm *L* (i.e., $V_u > V_l$). Let us assume that $V_u = E_u$ = Rs 100,000 and $V_l = E_l + D_l$ = Rs 40,000 + Rs 50,000 = Rs 90,000. Further, suppose that you still own 10 per cent shares in the unlevered firm *U*. Your return and investment will be:

$$\text{Return} = 0.10\ (10{,}000) = \text{Rs } 1{,}000$$

$$\text{Investment} = 0.10\ (100{,}000) = \text{Rs } 10{,}000$$

You can design a better investment strategy. You should do the following:

1. Sell your shares in firm *U* for Rs 10,000.
2. Buy 10 per cent of firm *L*'s shares and debt:

$$\text{Investment} = 0.10\,(40{,}000 + 50{,}000)$$
$$= 4{,}000 + 5{,}000 = \text{Rs } 9{,}000$$

Your investment in firm *L* is Rs 9,000. You have extra cash of Rs 1,000. Since you own 10 per cent of equity and debt of firm *L*, your return will include both equity income and interest income. Thus your return is Rs 1,000:

$$\text{Return} = 0.10\,(10{,}000) = 0.10(10{,}000 - 3{,}000) + 0.10(3{,}000)$$
$$= \text{Rs } 1{,}000$$

Note that your alternate investment strategy pays you off the same return but at a lesser investment. Both strategies give the investor same return, but your alternate investment strategy costs you less since $V_l < V_u$. In such a situation, investors will sell their shares in the unlevered firm and buy the shares and debt of the levered firm. As a result of this switching, the market value of the levered firm's shares will increase and that of the unlevered firm will decline. Ultimately, the price equilibrium will be reached (i.e., $V_l = V_u$) and there will be no advantage of switching anymore.

We can generalise our discussion in the formal terms.[10] In the first instance, let the value of levered firm *L* be greater than the value of unlevered firm *U* (i.e., $V_l > V_u$). Both firms earn the same expected net operating income, $\overline{X}$. The borrowing and lending rate, k_d, is same for

10. Modigliani and Miller, Reply to Heins and Sprenkle, *American Economic Review*, 59 (Sept. 1969), pp. 592–95.

both corporations and individuals. Assume that an investor holds α (alpha) fraction of firm *L*'s shares. His investment and return will be as follows:

	Investment	***Return***
Investment in *L*'s shares	$\alpha (V_1 - D_1)$	$\alpha (\overline{X} - k_d D_1)$

The investor can also design the following alternate investment strategy:

	Investment	***Return***
Buy fraction of *U*'s shares	αV_u	$\alpha \overline{X}$
Borrow equal to fraction of *L*'s debt	$- \alpha D_1$	$- \alpha k_d D_1$
	$\alpha (V_u - D_1)$	$\alpha (\overline{X} - k_d D_1)$

The investor obtains the same return, $\alpha(\overline{X} - k_d D_1)$ in both the cases, but his first investment strategy costs more since $V_l > V_u$. The rational investors at the margin would prefer switching from levered to unlevered firm. The increasing demand for the unlevered firm's shares will increase their market price, while the declining demand for the levered firm's shares will decrease their market price. Ultimately, market values of the two firms will reach equilibrium, and henceforth, arbitrage will not be beneficial.

Let us take the opposite case where $V_u > V_l$. Suppose our investor holds a fraction of firm *U*'s shares. His investment and return will be as follows:

	Investment	***Return***
Investment in *U*'s shares	αV_u	$\alpha \overline{X}$

The investor can design an alternate investment strategy as follows:

	Investment	***Return***
Buy fraction of *L*'s shares	$\alpha (V_1 - D_1)$	$\alpha (\overline{X} - k_d D_1)$
Buy equal to fraction of *L*'s debt	$+ \alpha D_1$	$+ \alpha k_d D_1$
	αV_1	$\alpha \overline{X}$

The investor earns the same return from the alternate strategy but by investing less since $V_u > V_l$. Other investors can also benefit similarly by switching their investment. Investors will sell shares of firm *U* and buy shares of firm *L*. This arbitrage will cause the price of firm *U*'s shares to decline and that of firm *L*'s shares to increase. It will continue until the value of the levered firm's equals that of the unlevered firm. Thus, in equilibrium the value of levered firm will be equal to the value of unlevered firm, i.e., $V_l = V_u$.

On the basis of the arbitrage process, *MM* conclude that the market value of a firm is not affected by leverage. Thus, the financing (or capital structure) decision is irrelevant. It does not help in creating any wealth for shareholders. Hence one capital structure is as much desirable (or undesirable!) as the other.

5.4.2 Key Assumptions

MM's Proposition I is based on certain assumptions. These assumptions relate to the behaviour of investors and capital markets, the actions of the firm and the tax environment.

- ***Perfect capital markets*** Securities (shares and debt instruments) are traded in the **perfect capital market** situation. This specifically means that (*a*) investors are free to buy or sell securities; (*b*) they can borrow without restriction at the same terms as the firms do; and (*c*) they behave rationally. It is also implied that the transaction costs, i.e., the cost of buying and selling securities, do not exist. The assumption that firms and individual investors can borrow and lend at the same rate of interest is a very critical assumption for the validity of *MM* Proposition I. The homemade leverage will not be a substitute for the corporate leverage if the borrowing and lending rates for individual investors are different from firms.

NOTES

- ***Homogeneous risk classes*** Firms operate in similar business conditions and have similar operating risk. They are considered to have similar operating risk and belong to *homogeneous risk classes* when their expected earnings have identical risk characteristics. It is generally *implied* under the MM hypothesis that firms within same industry constitute a homogeneous class.
- ***Risk*** The operating risk is defined in terms of the variability of the net operating income (NOI). The risk of investors depends on both the random fluctuations of the expected NOI and the possibility that the actual value of the variable may turn out to be different than their best estimate.[11]
- ***No taxes*** There do not exist any corporate taxes. This implies that interest payable on debt do not save any taxes.
- ***Full payout*** Firms distribute all net earnings to shareholders. This means that firms follow a *100 per cent dividend payout*.

Proposition II

We have explained earlier that the value of the firm depends on the expected net operating income and the opportunity cost of capital, k_a, which is same for both levered and unlevered firms. In the absence of corporate taxes, the firm's capital structure (financial leverage) does not affect its net operating income. Hence, for the value of the firm to remain constant with financial leverage, the opportunity cost of capital, k_a, must also stay constant with financial leverage. The opportunity cost of capital, k_a depends on the firm's operating risk. Since financial leverage does not affect the firm's operating risk, there is no reason for the opportunity cost of capital, k_a to change with financial leverage.

Financial leverage does not affect a firm's net operating income, but as we have discussed in Chapter 14, it does affect shareholders' return (EPS and ROE). EPS and ROE increase with leverage when the interest rate is less than the firm's return on assets. Financial leverage also increases shareholders' financial risk by amplifying the variability of EPS and ROE. Thus, financial leverage causes two opposing effects: it increases the shareholders' return but it also increases their financial risk. Shareholders will increase the required rate of return (i.e., the cost of equity) on their investment to compensate for the financial risk. The higher the financial risk, the higher the shareholders' required rate of return or the cost of equity. This is *MM*'s Proposition II.

An all-equity financed or unlevered firm has no debt; its opportunity cost of capital is equal its cost of equity; that is, unlevered firm's $k_e = k_a$. *MM*'s Proposition II provides justification for the levered firm's opportunity cost of capital remaining constant with financial leverage. In simple words, it states that the cost of equity, k_e, will increase enough to offset the advantage of cheaper cost of debt so that the opportunity cost of capital, k_a, does not change. A levered firm has financial risk while an unlevered firm is not exposed to financial risk. Hence, a levered firm will have higher required return on equity as compensation for financial risk. The cost of equity for a levered firm should be higher than the opportunity cost of capital, k_a; that is, the levered firm's $k_e > k_a$. It should be equal to constant k_a, plus a **financial risk premium**. How is this financial risk premium determined? You know that a levered firm's opportunity cost of capital is the weighted average of the cost of equity and the cost of debt:

$$k_a = k_e \times \frac{E}{E+D} + k_d \frac{D}{E+D}$$

You can solve this equation to determine the levered firm's cost of equity, k_e:

$$k_e = k_a + (k_a - k_d)\frac{D}{E} \tag{11}$$

You may note from the equation that for an unlevered firm, D (debt) is zero; therefore, the second part of the right-hand side of the equation is zero and the opportunity cost of capital, k_a equals the cost of equity, k_e. We can see from the equation that financial risk premium of a levered firm is equal to debt-equity ratio, D/E, times the spread between the constant opportunity cost of

11. Robicheck, A. and Myers, 8., Optimal Financing Decisions, Prentice-Hall Inc., 1965, pp. 31–34.

capital and the cost of debt, ($k_o - k_d$). The required return on equity is positively related to financial leverage, because the financial risk of shareholders increases with financial leverage. The cost of equity, k_e, is a linear function of financial leverage, D/E. It is noteworthy that the functional relationship given in Equation (11) is valid irrespective of any particular valuation theory. For example, MM assume the levered firm's opportunity cost of capital or WACC to be constant, while according to the traditional view WACC depends on financial leverage.

Let us consider the following example to understand the implications of MM's Proposition II.

Illustration 5.4: Implications of MM's Proposition II

Suppose Information Technology Limited (ITL) is an all-equity financed company. It has 10,000 shares outstanding. The market value of these shares is Rs 120,000. The expected operating income of the company is Rs 18,000. The expected EPS of the company is: Rs 18,000/10,000 = Rs 1.80. Since ITL is an unlevered company, its opportunity cost of capital will be equal to its cost of equity, k_e:

$$k_a = k_e = \frac{\text{Expected NOI}}{\text{Market value of debt and equity}}$$

$$= \frac{18{,}000}{120{,}000} = 0.15 \text{ or } 15\%$$

Let us assume that ITL is considering borrowing Rs 60,000 at 6 per cent rate of interest and buy back 5,000 shares at the market value of Rs 60,000. Now ITL has Rs 60,000 equity and Rs 60,000 debt in its capital structure. Thus, the company's debt-equity ratio is 1. The change in the company's capital structure does not affect its assets and expected net operating income. However, EPS will change. The expected EPS is:

$$\text{EPS} = \frac{\text{Net income}}{\text{Number of shares}} = \frac{18{,}000 - 3{,}600}{5{,}000} = \text{Rs } 2.88$$

ITL's expected EPS increases by 60 per cent due to financial leverage. If ITL's expected NOI fluctuates, its EPS will show greater variability with financial leverage than as an unlevered firm. Since the firm's operating risk does not change, its opportunity cost of capital (or WACC) will still remain 15 per cent. The cost of equity will increase to compensate for the financial risk:

$$k_e = k_a + (k_a - k_d)\frac{D}{E}$$

$$= 0.15 + (0.15 - 0.06)\frac{60{,}000}{60{,}000} = 0.24 \text{ or } 24\%$$

The crucial part of Proposition II is that the levered firm's opportunity cost of capital will not rise even if very excessive use of financial leverage is made. The excessive use of debt increases the risk of default. Hence, in practice, the cost of debt, k_d, will increase with high level of financial leverage. *MM* argue that when k_d increases, k_e will increase at a decreasing rate and may even turn down eventually.[12] The reason for this behaviour of k_e, is that debt-holders, in the extreme leveraged situations, own the firm's assets and bear some of the firm's business risk. Since the operating risk of shareholders is transferred to debt-holders, k_e declines. This is illustrated in Figure 5.5.

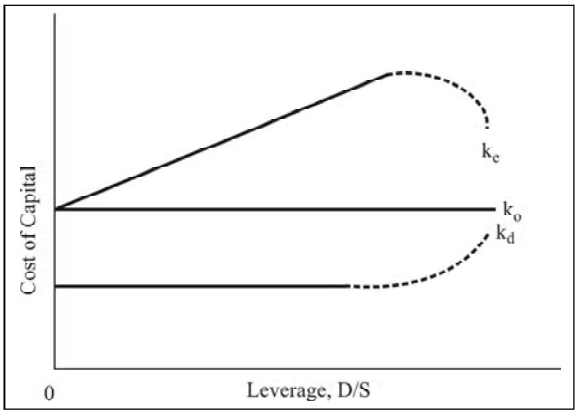


Figure 5.5: Cost of equity under the M–M

12. Modigliani and Miller, *op. cit.*

NOTES

5.4.3 Criticism of the MM Hypothesis

The arbitrage process is the behavioural foundation for *MM*'s hypothesis. The shortcomings of this hypothesis lie in the assumption of perfect capital market in which arbitrage is expected to work. Due to the existence of imperfections in the capital market, arbitrage may fail to work and may give rise to discrepancy between the market values of levered and unlevered firms. The arbitrage process may fail to bring equilibrium in the capital market for the following reasons:[13]

Lending and borrowing rates discrepancy The assumption that firms and individuals can borrow and lend at the same rate of interest does not hold in practice. Because of the substantial holding of fixed assets, firms have a higher credit standing. As a result, they are able to borrow at lower rates of interest than individuals. If the cost of borrowing to an investor is more than the firm's borrowing rate, then the equalisation process will fall short of completion.

Non-substitutability of personal and corporate leverages It is incorrect to assume that "personal (home-made) leverage" is a perfect substitute for "corporate leverage." The existence of limited liability of firms in contrast with unlimited liability of individuals clearly places individuals and firms on a different footing in the capital markets. If a levered firm goes bankrupt, all investors stand to lose to the extent of the amount of the purchase price of their shares. But, if an investor creates personal leverage, then in the event of the firm's insolvency, he would lose not only his principal in the shares of the unlevered company, but will also be liable to return the amount of his personal loan. Thus, it is more risky to create personal leverage and invest in the unlevered firm than investing directly in the levered firm.

Transaction costs The existence of transaction costs also interferes with the working of arbitrage. Because of the costs involved in the buying and selling securities, it would become necessary to invest a greater amount in order to earn the same return. As a result, the levered firm will have a higher market value.

Institutional restrictions Institutional restrictions also impede the working of arbitrage. The "home-made" leverage is not practically feasible as a number of institutional investors would not be able to substitute personal leverage for corporate leverage, simply because they are not allowed to engage in the "home-made" leverage.

Existence of corporate tax The incorporation of the corporate income taxes will also frustrate *MM*'s conclusions. Interest charges are tax deductible. This, in fact, means that the cost of borrowing funds to the firm is less than the contractual rate of interest. The very existence of interest charges gives the firm a tax advantage, which allows it to return to its equity and debt-holders a larger stream of income than it otherwise could have. Consider an example.

Suppose a levered and an unlevered firms have NOI = Rs 10,000. Further, the levered has: k_d = 0.06 and D_l = Rs 20,000. Assume that the corporate income tax exists and the rate is 50 per cent. The unlevered firm's after tax operating income will be: NOI – tax on NOI, i.e., 10,000 – 10,000 × 0.50 = 10,000 – 5,000 = Rs 5000. Interest is tax exempt. Therefore, levered firm's taxes will be less. The after-tax net operating income of the levered firm will be: NOI – tax on NOI minus interest, i.e., 10,000 – (10,000 – 1,200) × 0.50 = 10,000 – 4,400 = Rs 5,600. Thus, the total after-tax operating earnings of debt-holders and equity holders is more in the case of the levered firm. Hence, the total market value of a levered firm should tend to exceed that of the unlevered firm for this very reason. This point is explained further in the following section.

Check Your Progress

6. What is Proposition I of Modigliani and Miller (MM) regarding capital structure?
7. What is the importance of net operating income in the MM hypothesis?
8. What are key assumptions of MM's Proposition I?
9. What is Proposition II in the MM hypothesis?
10. What is the main criticism of the arbitrage process in the MM hypothesis?

5.5 RELEVANCE OF CAPITAL STRUCTURE: THE MM HYPOTHESIS UNDER CORPORATE TAXES

MM's hypothesis that the value of the firm is independent of its debt policy is based on the critical assumption that corporate income taxes do not exist. In reality, corporate income taxes exist, and interest paid to debt-holders is treated as a deductible expense. Thus, interest payable

13. Solomon, *op. cit.*, Durand, *op.cit.* Also see, Pandey, I.M., *Capital Structure and the Cost of Capital*, Vikas, reprint, 1996.

NOTES

by firms saves taxes. This makes debt financing advantageous. In their 1963 article, *MM* show that the value of the firm will increase with debt due to the deductibility of interest charges for tax computation, and the value of the levered firm will be higher than of the unlevered firm.[14] Consider an example.

Illustration 5.5: Debt Advantage: Interest Tax Shields

Suppose two firms *L* and *U* are identical in all respects except that firm *L* is levered and firm *U* is unlevered. Firm *U* is an all-equity financed firm while firm *L* employs equity and Rs 5,000 debt at 10 per cent rate of interest. Both firms have an expected earning before interest and taxes (or net operating income) of Rs 2,500, pay corporate tax at 50 per cent and distribute 100 per cent earnings as dividends to shareholders.

The after-tax income accruing to investors of firm *L* and firm *U* are shown in Table 5.5. You may notice that the total income after corporate tax is Rs 1,250 for the unlevered firm *U* and Rs 1,500 for the levered firm *L*. Thus, the levered firm *L*'s investors are ahead of the unlevered firm *U*'s investors by Rs 250. You may also note that the tax liability of the levered firm *L* is Rs 250 less than the tax liability of the unlevered firm *U*. For firm *L* the tax savings has occurred on account of payment of interest to debt-holders. Hence, this amount is the *interest tax shield or tax advantage of debt* of firm *L*: $0.5 \times (0.10 \times 5{,}000) = 0.5 \times 500 = \text{Rs } 250$. Thus

$$\text{Interst tax shield} = \text{corporate tax rate} \times \text{interest}$$

$$\text{INTS} = T \times \text{INT} = T \times k_d D \tag{12}$$

where T is the corporate tax rate, k_d is the cost of debt, D is the amount of debt and $k_d D$ is the amount of interest (INT). The total after-tax income of investors of firm *L* is more by the amount of the interest tax shield. The levered firm's after-tax income (Table 5.5) consists of after-tax net operating income and interest tax shield. Note that the unlevered firm is an all-equity firm and its after-tax income is just equal to the after-tax net operating income:

The after-tax income of levered firm

– the after tax income of unlevered firm

= interest tax shield

$$= \left[\bar{X}(1-T) + Tk_d D\right] - \left[\bar{X}(1-T)\right] = Tk_d D$$

$$= \left[2{,}500(1-0.50) + 0.50 \times 0.10 \times 5{,}000\right] - \left[2{,}500(1-0.50)\right]$$

$$= 0.50 \times 0.10 \times 5{,}000 = 1{,}250 - 1{,}000 = \text{Rs } 250$$

Table 5.5: Income of Levered and Unlevered Firms under Corporate Income Tax

Income	*Firm U*	*Firm L*
Net operating income	2,500	2,500
Interest	0	500
Taxable income	2,500	2,000
Tax at 50%	1,250	1,000
Income after tax	1,250	1,000
Total income to investors after corporate tax*:*		
Dividends to shareholders	1,250	1,000
Interest to debt-holders	0	500
Total income to investors	1,250	1,500
Interest tax shield (tax advantage of debt)	0	250
Relative advantage of debt: 1,500/1,250		1.20

5.5.1 Value of Interest Tax Shield

Interest tax shield is a cash inflow to the firm and therefore, it is valuable. Suppose that firm *L* will employ debt of Rs 5,000 perpetually (forever). If firm *L*'s debt of Rs 5,000 is permanent, then the

14. Modigliani, F. and M.H. Miller, Corporate Income Taxes and the Cost of Capital : A Correction, *American Economic Review*, 53, June 1966, pp. 433–43.

NOTES

interest tax shield of Rs 250 is a perpetuity. What is the value of this perpetuity? For this, we need a discount rate, which reflects the riskiness of these cash flows.

The cash flows arising on account of interest tax shield are less risky than the firm's operating income that is subject to business risk. Interest tax shield depends on the corporate tax rate and the firm's ability to earn enough profit to cover the interest payments. The corporate tax rates do not change very frequently. Firm *L* can be assumed to earn at least equal to the interest payable otherwise it would not like to borrow. Thus, the cash inflows from interest tax shield can be considered less risky, and they should be discounted at a lower discount rate. It will be reasonable to assume that the risk of interest tax shield is the same as that of the interest payments generating them. Thus, the discount rate is 10 per cent, which is the rate of return required by debt-holders. The present value of the unlevered firm *L*'s perpetual interest tax shield of Rs 250 is:

$$\text{PV of interest tax shield} = \frac{250}{0.10} = \text{Rs } 2{,}500$$

Thus, under the assumption of permanent debt, we can determine the present value of the interest tax shield as follows:

$$\text{PV of interest tax shield} = \frac{\text{Corporate tax rate} \times \text{interest}}{\text{Cost of debt}}$$

$$\text{PVINTS} = \frac{T \times k_d D}{k_d} = TD \tag{13}$$

You may note from Equation (13) that the present value of the interest tax shields (PVINTS) is independent of the cost of debt: it is simply the corporate tax rate times the amount of permanent debt (TD). For firm *L*, the present value of interest tax shield can be determined as: 0.50 × 5,000 = Rs 2,500. Note that the government, through its fiscal policy, assumes 50 per cent (the corporate tax rate) of firm *L*'s Rs 5,000 debt obligation.

5.5.2 Value of the Levered Firm

In our example, the unlevered firm *U* has the after-tax operating income of Rs 1,250. Suppose the opportunity cost of capital of the unlevered firm *U*, $k_u = k_a$ is 12.5 per cent. The value of the unlevered firm *U* will be Rs 10,000:

$$\text{Value of the unlevered firm} = \frac{\text{After-tax net operating income}}{\text{Unlevered firm's cost of capital}}$$

$$V_u = \frac{\text{NOI}(1-T)}{k_a} = \frac{1{,}250}{0.125} = \text{Rs } 10{,}000$$

What is the total value of the levered firm *L*? The after-tax income of the levered firm includes the after-tax operating income, NOI(1 – *T*) plus the interest tax shield, Tk_dD. Therefore, the value of the levered firm is the sum of the present value of the after-tax net operating income and the present value of interest tax shield. The after-tax net operating income, NOI (1 – *T*), of the levered firm *L* is equal to the after-tax income of the pure-equity (the unlevered) firm *U*. Hence, the opportunity cost of capital of a pure-equity firm, k_u or k_a, should be used to discount the stream of the after-tax operating income of the levered firm. Thus, the value of the levered firm *L* is equal to the value of the unlevered firm *U* plus the present value of the interest tax shield:

$$\begin{aligned}\text{Value of levered firm} &= \text{Value of unlevered firm} + \text{PV of tax shield} \\ &= 10{,}000 + 2{,}500 = \text{Rs } 12{,}500\end{aligned}$$

We can write the formula for determining the value of the levered firm as follows:

$$V_1 = \frac{\overline{X}(1-T)}{k_a} + \frac{Tk_dD}{k_d} \tag{14}$$

$$V_1 = V_u + TD \tag{15}$$

Equation (15) implies that when the corporate tax rate, T, is positive ($T > 0$), the value of the levered firm will increase continuously with debt.[15] Thus, theoretically the value of the firm will be maximised when it employs 100 per cent debt. This is shown in Figure 5.6.

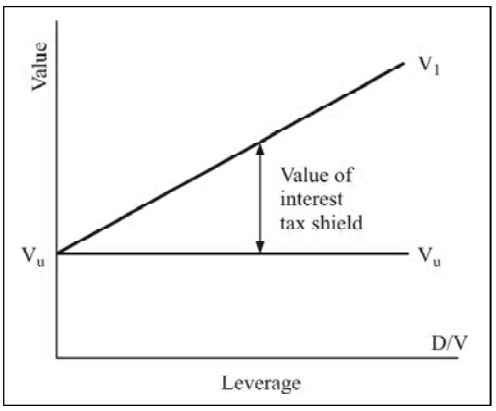


Figure 5.6: Value of the levered firm

One significant implication of the MM hypothesis with the corporate tax in practice is that a firm without debt or with low debt can enhance its value if it exchanges debt for equity. We consider the example of Infosys Technologies Limited to illustrate this point.

5.5.3 Enhancing the Firm Value through Debt: Infosys Technologies Limited

Infosys is a highly regarded computer software company. The company's market value of equity is about ten times of its book value. It does not employ any debt. The summarised book and market value balance sheet of the company for year ending on 31 March 2003 is given in Table 5.6.

Table 5.6: Infosys Technologies Limited: Balance Sheet as on 31 March 2003

Book Value	***Rs in million***		***Rs in million***
Equity	28,607	Net current assets	20,179
Debt	0	Long-term assets	8,427
Total	28,607	Total	28,606
Market Value	***Rs in million***		***Rs in million***
Equity	267,108	Net current assets	20,179
Debt	0	Long-term assets	246,929
Total	267,108	Total	267,108

What will happen to Infosys' market value if it decides to replace equity by debt? Suppose the company borrows Rs 14,000 million at 10 per cent rate of interest and uses the money to buy back its shares (at the current market value). The book value total assets and capital will not show any changes; however, the mix of capital will change. Debt will increase by Rs 14,000 million and the

15. Equation (13) can also be written as follows:

$$V_l = V_u + TD$$

$$\frac{V_l}{V_l} = \frac{V_u}{V_l} + \frac{TD}{V_l},\ 1 = \frac{V_u}{V_l} + TL \quad \text{(setting } (D/V_l) = L$$

$$V_l = \frac{V_u}{1 - TL}$$

Thus, for $T > 0$, V_l will increase with L, and will be maximum at $L = 1$.

NOTES

book value equity will reduce by this amount. Suppose that debt is permanent and the corporate tax rate is 35 per cent. The company will save taxes on interest paid to debt-holders: $0.35 \times 0.10 \times 14{,}000$ = Rs 490 million. The value of the tax saved is: 490/0.10 = Rs 4,900 million. The firm is richer by Rs 4,900 million, and its value should increase to Rs 272,008 million. The increase in the firm's value is a gain to its shareholders. How? The value of equity after recapitalisation is Rs 258,008 million. Thus, the value of equity drops by Rs 9,100 million (Rs 267,108 – Rs 258,008 = Rs 9,100 million). But remember that the shareholders received Rs 14,000 million when the company bought back their shares. Hence, the net gain of shareholders is Rs 4,900.

Table 5.7: Infosys Technologies Limited

Book value	***Rs in million***		***Rs in million***
Equity	14,606	Net current assets	20,179
Debt	14,000	Long-term assets	8,427
Total	28,606	Total	28,606
Market value	***Rs in million***		***Rs in million***
Equity	258,008	Net current assets	20,179
Debt	14,000	Long-term assets	246,929
		Value of tax shield	4,900
Total	272,008	Total	272,008

5.5.4 Implications of the MM Hypothesis with Corporate Taxes

The MM's "tax-corrected" view suggests that, because of the tax deductibility of interest charges, a firm can increase its value with leverage. Thus, the optimum capital structure is reached when the firm employs almost 100 per cent debt. But the observed experience does not entirely support this view. In practice, firms do not employ large amounts of debt, nor are lenders ready to lend beyond certain limits, which they decide. MM suggest that firms would adopt a *target debt ratio* so as not to violate the limits of the debt level imposed by lenders. They state:

> …existence of a tax advantage for debt financing... does not necessarily mean that corporations should at all times seek to use the maximum possible amount of debt in their capital structures... (*T*) here are, as we pointed out, limitations imposed by lenders, as well as many other dimensions in real-world problems of financial strategy which are not fully comprehended within the framework of static equilibrium models... These additional considerations, which are typically grouped under the rubric of the need for preserving flexibility, will normally imply the maintenance by the corporation of a substantial reserve of untapped borrowing power.[16]

Why do companies not employ extreme level of debt in practice? There could be two possibilities: First, we need to consider the impact of both corporate and personal taxes for corporate borrowing. Personal income tax may offset the advantage of the interest tax shield. Second, borrowing may involve extra costs (in addition to contractual interest cost)—**costs of financial distress—**that may also offset the advantage of the interest shield. We examine these points in the following sections.

5.6 CAPITAL STRUCTURE PLANNING AND POLICY

Some companies do not plan their capital structures; it develops as a result of the financial decisions taken by the financial manager without any formal policy and planning. Financing decisions are reactive and they evolve is response to the operating decisions. These companies may prosper in the short-run, but ultimately they may face considerable difficulties in raising

Check Your Progress

11. What happens when corporate income taxes are introduced in the argument?

16. Modigliani and Miller, *op. cit.*

NOTES

funds to finance their activities. With unplanned capital structure, these companies may also fail to economise the use of their funds. Consequently, it is being increasingly realised that a company should plan its capital structure to maximise the use of the funds and to be able to adapt more easily to the changing conditions.

Theoretically, the financial manager should plan an **optimum capital structure** for his company. The optimum capital structure is one that maximises the market value of the firm. So far our discussion of the optimum capital structure has been theoretical. In practice, the determination of an optimum capital structure is a formidable task, and one has to go beyond the theory. There are significant variations among industries and among companies within an industry in terms of capital structure. Since a number of factors influence the capital structure decision of a company, the judgment of the person making the capital structure decision plays a crucial part. Two similar companies may have different capital structures if the decision-makers differ in their judgment of the significance of various factors. A totally theoretical model perhaps cannot adequately handle all those factors, which affect the capital structure decision in practice. These factors are highly psychological, complex and qualitative and do not always follow accepted theory, since capital markets are not perfect and the decision has to be taken under imperfect knowledge and risk.

The board of directors or the chief financial officer (CFO) of a company should develop an appropriate or **target capital structure**, which is most advantageous to the company. This can be done only when all those factors, which are relevant to the company's capital structure decision, are properly analysed and balanced. The capital structure should be planned generally keeping in view the interests of the equity shareholders and the financial requirements of a company. The equity shareholders, being the owners of the company and the providers of risk capital (equity), would be concerned about the ways of financing a company's operations. However, the interests of other groups, such as employees, customers, creditors, society and government, should also be given reasonable consideration. As stated in Chapter 1, when the company lays down its objective in terms of the shareholder wealth maximisation (SWM), it is generally compatible with the interests of other groups. Thus, while developing an appropriate capital structure for its company, the financial manager should *inter alia* aim at maximising the long-term market price per share. Theoretically, there may be a precise point or range within which the market value per share is maximum. In practice, for most companies within an industry there may be a range of an appropriate capital structure within which there would not be great differences in the market value per share. One way to get an idea of this range is to observe the capital structure patterns of companies vis-à-vis their market prices of shares. It may be found empirically that there are not significant differences in the share values within a given range. The management of a company may fix its capital structure near the top of this range in order to make maximum use of favourable leverage, subject to other requirements such as flexibility, solvency, control and norms set by the financial institutions, the Security Exchange Board of India (SEBI) and stock exchanges.

5.6.1 Elements of Capital Structure

A company formulating its long-term financial policy should, first of all, analyse its current financial structure. The following are the important elements of the company's financial structure that need proper scrutiny and analysis:[17]

Capital Mix Firms have to decide about the mix of debt and equity capital. Debt capital can be mobilised from a variety of sources. How heavily does the company depend on debt? What is the mix of debt instruments? Given the company's risks, is the reliance on the level and instruments of debt reasonable? Does the firm's debt policy allow it flexibility to undertake strategic investments in adverse financial conditions? The firms and analysts use debt ratios, debt-service coverage ratios, and the funds flow statement to analyse the capital mix.

Maturity and Priority The maturity of securities used in the capital mix may differ. Equity is the most permanent capital. Within debt, commercial paper has the shortest maturity and public debt

17. Piper, Thomas R. and Weinhol, Wolf A., "How Much Debt is Right for Your Company?" *Harward Business Review,* 1982; and Bruner, Robert F., "Structuring Corporate Financial Policy: Diagnosis of Problems and Evaluation of Strategies", in Bruner, Robert F., *Cases Studies in Finance: Managing for Value Creation,* Illinois: Irwin/McGraw, 1999, pp. 832–49.

NOTES

longest. Similarly, the priorities of securities also differ. **Capitalised debt** like lease or hire purchase finance is quite safe from the lender's point of view and the value of assets backing the debt provides the protection to the lender. Collateralised or secured debts are relatively safe and have priority over unsecured debt in the event of insolvency. Do maturities of the firm's assets and liabilities match? If not, what trade-off is the firm making? A firm may obtain a risk-neutral position by matching the maturity of assets and liabilities; that is, it may use current liabilities to finance current assets and short-medium and long-term debt for financing the fixed assets in that order of maturities. In practice, firms do not perfectly match the sources and uses of funds. They may show preference for retained earnings. Within debt, they may use long-term funds to finance current assets and assets with shorter life. Some firms are more aggressive, and they use short-term funds to finance long-term assets.

Terms and Conditions Firms have choices with regard to the basis of interest payments. They may obtain loans either at fixed or floating rates of interest. In case of equity, the firm may like to return income either in the form of large dividends or large capital gains. What is the firm's preference with regard to the basis of payments of interest and dividend? How do the firm's interest and dividend payments match with its earnings and operating cash flows? The firm's choice of the basis of payments indicates the management's assessment about the future interest rates and the firm's earnings. Does the firm have protection against interest rates fluctuations? The financial manager can protect the firm against interest rates fluctuations through the **interest rates derivatives.**[18] There are other important terms and conditions that the firm should consider. Most loan agreements include what the firm can do and what it can't do. They may also state the schemes of payments, pre-payments, renegotiations etc. What are the lending criteria used by the suppliers of capital? How do negative and positive conditions affect the operations of the firm? Do they constraint and compromise the firm's operating strategy? Do they limit or enhance the firm's competitive position? Is the company level to comply with the terms and conditions in good time and bad time?

Currency Firms in a number of countries have the choice of raising funds from the overseas markets. Overseas financial markets provide opportunities to raise large amounts of funds. Accessing capital internationally also helps company to globalise its operations fast. Because international financial markets may not be perfect and may not be fully integrated, firms may be able to issue capital overseas at lower costs than in the domestic markets. The exchange rates fluctuations can create risk for the firm in servicing it foreign debt and equity. The financial manager will have to ensure a system of risk hedging. Does the firm borrow from the overseas markets? At what terms and conditions? How has firm benefited – operationally and/or financially in raising funds overseas? Is there a consistency between the firm's foreign currency obligations and operating inflows?

Financial innovations Firms may raise capital either through the issues of simple securities or through the issues innovative securities. Financial innovations are intended to make the security issue attractive to investors and reduce cost of capital. For example, a company may issue convertible debentures at a lower interest rate rather than non-convertible debentures at a relatively higher interest rate. A further innovation could be that the company may offer higher simple interest rate on debentures and offer to convert interest amount into equity. The company will be able to conserve cash outflows. A firm can issue varieties of option-linked securities; it can also issue tailor-made securities to large suppliers of capital. The financial manager will have to continuously design innovative securities to be able to reduce the cost. An innovation introduced once does not attract investors any more. What is the firm's history in terms of issuing innovative securities? What were the motivations in issuing innovative securities and did the company achieve intended benefits?

Financial market segments There are several segments of financial markets from where the firm can tap capital. For example, a firm can tap the private or the public debt market for raising long-term debt. The firm can raise short-term debt either from banks or by issuing commercial papers or certificate deposits in the money market. The firm also has the alternative of raising short-term funds by public deposits. What segments of financial markets have the firm tapped for raising funds and why? How did the firm tap and approach these segments?

18. Derivatives are explained in Chapter 33.

NOTES

5.6.2 Framework for Capital Structure: The FRICT Analysis

A financial structure may be evaluated from various perspectives. From the owners' point of view, return, risk and value are important considerations. From the strategic point of view, flexibility is an important concern. Issues of control, flexibility and feasibility assume great significance. A sound capital structure will be achieved by balancing all these considerations:

- ***Flexibility*** The capital structure should be determined within the debt capacity of the company, and this capacity should not be exceeded. The debt capacity of a company depends on its ability to generate future cash flows. It should have enough cash to pay creditors' fixed charges and principal sum and leave some excess cash to meet future contingency. The capital structure should be flexible. It should be possible for a company to adapt its capital structure with a minimum cost and delay if warranted by a changed situation. It should also be possible for the company to provide funds whenever needed to finance its profitable activities.
- ***Risk*** The risk depends on the variability in the firm's operations. It may be caused by the macroeconomic factors and industry and firm specific factors. The excessive use of debt magnifies the variability of shareholders' earnings, and threatens the solvency of the company.
- ***Income*** The capital structure of the company should be most advantageous to the owners (shareholders) of the firm. It should create value; subject to other considerations, it should generate maximum returns to the shareholders with minimum additional cost.
- ***Control*** The capital structure should involve minimum risk of loss of control of the company. The owners of closely held companies are particularly concerned about dilution of control.
- ***Timing*** The capital structure should be feasible to implement given the current and future conditions of the capital market. The sequencing of sources of financing is important. The current decision influences the future options of raising capital.

The FRICT (flexibility, risk, income, control and timing) analysis provides the general framework for evaluating a firm's capital structure.[19] The particular characteristics of a company may reflect some additional specific features. Further, the emphasis given to each of these features will differ from company to company. For example, a company may give more importance to flexibility than control, while another company may be more concerned about solvency than any other requirement. Furthermore, the relative importance of these requirements may change with shifting conditions. The company's capital structure should, therefore, be easily adaptable.

5.7 APPROACHES TO ESTABLISH TARGET CAPITAL STRUCTURE

The capital structure will be planned initially when a company is incorporated. The initial capital structure should be designed very carefully. The management of the company should set a **target capital structure** and the subsequent financing decisions should be made with a view to achieve the target capital structure. The financial manager has also to deal with an existing capital structure. The company needs funds to finance its activities continuously. Every time when funds have to be procured, the financial manager weighs the pros and cons of various sources of finance and selects the most advantageous sources keeping in view the target capital structure. Thus, the capital structure decision is a continuous one and has to be taken whenever a firm needs additional finances.

As discussed in the previous chapter and this chapter earlier, the following are the three most common approaches to decide about a firm's capital structure:

- ***EBIT-EPS approach*** for analysing the impact of debt on shareholders' return and risk.
- ***Valuation approach*** for determining the impact of debt on the shareholders' value.

Check Your Progress

12. In practice, how does a company plan its capital structure?
13. What is FRICT Analysis of a financial structure of a company?

19. Bruner, Robert, F., *op. cit.*

- ***Cash flow approach*** for analysing the firm's ability to service debt and avoid financial distress.

NOTES

5.7.1 EBIT-EPS Analysis

Let us summarise the most important points here. The EBIT-EPS analysis is an important tool to analyse the impact of alternative financial plans on the shareholders' income and its variability. The firm should consider the possible fluctuations in EBIT and examine their impact on EPS (or ROE) under different financial plans. If the probability of the rate of return on the firm's assets falling below the cost of debt is low, the firm can employ high debt to increase EPS. Other things remaining the same, this may also have a favourable effect on the market value the firm's share. On the other hand, if the probability of the rate of return on the firm's assets falling below the cost of debt is very high, the firm should refrain from employing too much debt capital. Thus, the greater the level of EBIT and lower the probability of downward fluctuations, the more beneficial it is to employ debt. However, it should be realised that the EBIT-EPS analysis is a first step in deciding about a firm's capital structure. It suffers from certain limitations and does not provide unambiguous guide in determining the level of debt in practice.

EPS is one of the most widely used measures of a company's performance in practice. Hence, in choosing between debt and equity, sometimes too much attention is paid on EPS, which, however, has serious limitations as a financing-decision criterion. As discussed in Unit 1, the major shortcomings of the EPS as a financing-decision criterion are:

- It is based on arbitrary accounting assumptions and does not reflect the economic profits.
- It does not consider the time value of money.
- It ignores the variability about the expected value of EPS, and hence, ignores risk.

The belief that investors would be just concerned with the expected EPS is not well founded. Investors in valuing the shares of the company consider both expected value and risk (variability).[20]

EPS variability and financial risk We know that the EPS variability, resulting from the use of leverage, causes financial risk. The extreme variability in earnings can threaten the firm's solvency. A firm can avoid financial risk altogether if it does not employ any debt. But then the shareholders will be deprived of the benefit of the expected increases in EPS. Therefore, a company may employ debt to take advantage of the increase in earnings provided shareholders do not perceive the financial risk exceeding the benefit of increased EPS. As we have discussed earlier in this chapter, as a firm increases the use of debt, the expected EPS may continue to increase, but the value of the company may fall because of the greater exposure of shareholders to financial risk in the form of financial distress. Shareholders expect higher compensation for taking the additional financial risk.

The EPS criterion does not consider the long-term perspectives of financing decisions. It fails to deal with the risk-return trade-off. A long-term view of the effects of financing decisions will lead one to a criterion of wealth maximisation rather than EPS maximisation. *The EPS criterion is an important performance measure but not a decision criterion.*[21]

Given its limitations, should the EPS criterion be ignored in making financing decisions? Remember that it is an important index of the firm's performance and that investors rely heavily on it for their investment decisions. Investors also do not have information on the projected earnings and cash flows and they base their evaluation on historical data. In choosing between alternative financial plans, management should start with the evaluation of the impact of each alternative on near-term EPS. But the best interests of shareholders should guide management's ultimate decision making. Therefore, a long-term view of the effect of the alternative financial plans on the value of the shares should be taken. If management opts for a financial plan, which will maximise value in the long run but has an adverse impact on near-term EPS, the reasons must be communicated to

20. Modigliani and Miller, *op. cit.*
21. Solomon, E. and Pringle, *An Introduction to Financial Management*, Prentice-Hall of India, 1978, p. 449.

EXHIBIT 5.1: DEBT TRAP: CASE OF HINDUSTAN SHIPYARD

- The fluctuating raw materials and component prices cause ups and downs in the revenues and profits of a ship-building company. With the right operating strategy and appropriate prudent financing, a company can manage to sail safely. Hindustan Shipyard Limited (HSL), however, found it quite difficult to come out of the troubled waters due to huge borrowings. In 1990, it had total outstanding debt of Rs 554 crore: working capital loan Rs 138 crore, development loan for modernisation Rs 69 crore, and outstanding interest on these loans Rs 160 crore; cash credit Rs 62 crore, outstanding interest on cash credit Rs 65 crore and penal interest Rs 60 crore. How did this happen?
- HSL's trouble began when, between 1981 and 1982, Japanese and South Korean shipbuilders started offering "heavily subsidised rates" against the rates fixed by the Indian government, based on international parity price. In effect, building ships turned out to be unviable for the yard. Further, HSL's overtime wages bill soared up, being a highly overstaffed company. It had 11,000 workers in 1990. A lack of strategy paved way for unchecked downfall. Orders continued declining, and became almost nil by 1988 and 1989. To tide over this, company borrowed funds, and since operating performance did not improve, the company fell deeper and deeper into debt trap.
- HSL was technically insolvent. The capital restructuring plans helped to put the company back on its feet.

Source: Messias, Lionel, Hindustan Shipyard: A Dead Weight Debt, *The Economic Times*, 15 Feb. 1994.

investors. A careful communication to market will be helpful in reducing the misunderstanding between management and investors.[22]

Operating conditions and business risk The level and variability of EPS depends is the *growth* and *stability of sales*. As you may recall from Chapter 14, EPS will fluctuate with fluctuations in sales. The magnitude of the EPS variability with sales will depend on the degrees of operating and financial leverages employed by the company. A firm with stable sales and favourable cost and price structure and well-focused operating strategy will have stable earnings and cash flows and thus, it can employ a high degree of financial leverage; it will not face difficulty in meeting the fixed charges commitments of debt. The likely fluctuations in sales increase the business risk. A small change in sales can lead to a dramatic change in the earnings of a company when its fixed costs are high. The fixed interest charges shift the break-even point upward. Hence, shareholders perceive a high degree of financial risk if companies with high operating leverage employ high amount of debt. A company will get into a debt trap if operating conditions become unfavourable and if it lacks a well articulated, focussed strategy (see Exhibit 5.1 for an example of a company in a debt trap).

Sales of the consumer goods industries show wide fluctuations; therefore, they do not employ a large amount of debt. On the other hand, the sales of public utilities are quite stable and predictable. Public utilities, therefore, employ a large amount of debt to finance their assets. The expected growth in sales also affects the degree of leverage. The greater the expectation of growth, the greater the amount of external financing needed since it may not be possible for the firm to cope up with growth through internally generated funds. A number of managers consider debt to be cheaper and easy to raise. The growth firms, therefore, may usually employ a high degree of leverage. Companies with declining sales should not employ debt, as they would find difficulty in meeting their fixed obligations. Non-payment of fixed charges can force a company into liquidation. It may be noted that sales growth and stability is just one factor in the leverage decision; many other factors would dictate the final decision. There are instances of a large number of high growth firms employing no or small amount of debt.

5.7.2 Valuation Approach

We have discussed that shareholders assume a high degree of risk than debt-holders. Hence debt is a cheaper source of funds than equity. But debt causes financial risk, which increases the

22. *Ibid*., 451.

NOTES

cost of equity. Higher debt increases the costs of financial distress and the agency costs also increase. The tax deductibility of interest charges, however, adds value to shareholders. Thus, there is a trade-off between the tax benefits and the costs of financial distress and agency problems. The firm should employ debt to the point where the marginal benefits and costs are equal. This will be the point of maximum value of the firm and minimum weighted average cost of capital.

The difficulty with the valuation framework is that managers find it difficult to put into practice. It is not possible for them to quantify the effect of debt on the value of the firm. Also, the operations of the financial markets are so complicated that it is not easy for the financial managers to understand them. But the analysis of the impact of debt on the value is crucial and it must be carried out. A financial manager should think and act like investors. He or she must determine the contribution of alternative financial policies in creating value for shareholders. The most desirable capital structure is the one that creates the maximum value.

5.7.3 Cash Flow Analysis

One practical method of assessing the firm's ability to carry debt without getting into serious financial distress is to carry out a comprehensive cash flow analysis over a long period of time. A sound capital structure is expected to be conservative. Conservatism does not mean employing no debt or small amount of debt. Conservatism is related to the firm's ability to generate cash to meet the fixed charges created by the use of debt in the capital structure under adverse conditions. Hence, in practice, the question of the optimum debt-equity mix boils down to the firm's ability to service debt without any threat of insolvency and operating inflexibility. A firm is considered prudently financed if it is able to service its fixed charges under any reasonably predictable adverse conditions.

The fixed charges of a company include payment of interest and principal, and they depend on both the amount of loan, interest rates and the terms of payment. The amount of fixed charges may be high if the company employs a large amount of debt with short-term maturity. Whenever a company thinks of raising additional debt, it should analyse its expected future cash flows to meet the fixed charges. It is mandatory to pay interest and repay the principal amount of debt. If a company is not able to generate enough cash to meet its fixed obligation, it may face financial distress leading to insolvency. The companies expecting larger and stable cash inflows in the future can employ a large amount of debt in their capital structure. It is quite risky to employ high amount of debt by those companies whose cash inflows are unstable and unpredictable. It is possible for a high growth, profitable company to suffer from cash shortage if its liquidity (working capital) management is poor. We have examples of Indian companies like BHEL and NTPC, whose debtors are very sticky and they continuously face liquidity problem in spite of being profitable and high growth companies. Servicing debt proves burdensome for these companies.

Debt-servicing coverage ratio One important ratio, which should be examined at the time of planning the capital structure, is the ratio of expected net operating cash flows to fixed charges or the **debt-servicing coverage ratio**. This ratio indicates the number of times the fixed financial obligations are covered by the net operating cash flows generated by the company. The greater is the expected coverage ratio, the greater is the amount of debt a company could use. However, a company with a small coverage can also employ high amount of debt if there are not significant yearly variations in its operating cash flows and if there is a low probability of these cash flows being considerably less to meet fixed charges in a given period. Thus, it is not the average cash flows but the yearly cash flows, which are important to determine the debt capacity of a company. Fixed financial obligations must be met when due, not on an average or in most years, but always.[23] This requires a full cash flow analysis showing the impact of different capital structures under different economic conditions.[24]

Debt capacity The technique of cash flow analysis is helpful in determining a firm's debt capacity. **Debt capacity** is the amount, which a firm can service easily even under adverse

23. Johnson, R.L., *Financial Decision Making*, Goodyear, 1973.
24. Donaldson, G., *Corporate Debt Capacity*, Harvard Business School, 1961.

conditions; it is the amount that the firm *should* employ. There may be lenders who are prepared to lend to the firm at higher interest rates. But the firm should borrow only if it can service debt without any problem. A firm can avoid the risk of financial distress if it can maintain its ability to meet contractual obligation of interest and principal payments. Debt capacity, therefore, should be thought in terms of the operating cash flows servicing debt rather than debt ratios. A high debt ratio is not necessarily bad. If a firm can service high amount of debt without much financial risk, it will increase shareholders' wealth. On the other hand, a low debt ratio can prove to be burdensome for a firm, which has liquidity problem. A firm faces financial distress (or even insolvency) when it has cash flow problem. It is dangerous to finance a capital-intensive project out of borrowings, which has built in uncertainty about the earnings and cash flows. National Aluminium Company is an example of a wrong initial choice of capital structure, which was inconsistent with its operating conditions (see Exhibit 5.2).

Some companies define their target capital structure or debt capacity in terms of the debt rating they desire. They choose the debt-equity ratio consistent with the debt rating. They work out the financial consequences of this choice and adjust their operations and other sources of finance ensuring the feasibility of the chosen capital structure.

Components of cash flows The cash flows should be analysed over a long period of time, which can cover the various adverse phases, for determining the firm's debt policy.[25] The cash flow analysis involves preparing *proforma* cash flow statements showing the firm's financial conditions under adverse conditions such as a recession. The expected cash flows can be categorised into three groups:[26]

EXHIBIT 5.2: DEBT BURDEN UNDER CASH CRUNCH SITUATION: CASE OF NALCO

- National Aluminium Company (NALCO), started in 1981, is the largest integrated aluminium complex in Asia of total investment of Rs 2,408 crore, borrowings from a consortium of European banks financed to the extent of $ 830 million or Rs 1,119 crore (46.5 per cent). The loan was repayable by 1995. Aluminium is an electricity-intensive business; each tonne of aluminium needs over 15,000 kw of electricity. Since its commissioning in 1988, Nalco has exported substantial portion of its production since the domestic demand has been very low than what the company had projected at its inception. The falling international prices in last few years have eroded the company's profitability. The net profit of Rs 172 crore in 1989 dropped to Rs 14 crore in 1991–92. The Rs 1,119 crore Eurodollar loan has appreciated to Rs 2,667 crore inspite of having repaid Rs 644 crore. Due to profitability and liquidity problem and hit by the depreciating rupee and the liberalised exchange mechanism, the company is forced to reschedule repayments of its debt by the year 2003 instead of 1995. Nalco's debt-equity ratio has increased from 1:1 to 2.7:1.
- The reasons for Nalco's plight is its decision to go for the production of aluminium which consumes heavy electricity in addition to alumina. The problem of power shortage led to the setting up of power plant, which is proving very costly to the company. The overcapacities of aluminium production worldwide and highly competitive prices have added to Nalco's woes. Nalco is trying to get out of its problems by attempting to diversify into value-added products.
- Nalco's fate can change if the domestic demand for aluminium picks up and international prices rise. The mounting debt of the company poses a question: Should you use heavy dose of debt (since it is available from certain sources) to finance investments in a business like aluminium which has worldwide overcapacity, fluctuating international prices and expensive and short supply of electricity in the country in which it is set up? Debt would accentuate the financial crises when a company has built-in operating uncertainties.

Source: Based on an article by Sudipt Dutta, "NALCO: Under a Debt Mountain", *Business India*, August 17–30, 1992, pp. 77–78.

25. *Ibid*.
26. *Ibid*., Solomon and Pringle, p. 489.

NOTES

- Operating cash flows
- Non-operating cash flows
- Financial flows

Operating cash flows relate to the operations of the firm and can be determined from the projected profit and loss statements. The behaviour of sales volume, output price and input price over the period of analysis should be examined and predicted.

Non-operating cash flows generally include capital expenditures and working capital changes. During a recessionary period, the firm may have to specially spend on advertising etc. for the promotion of the product. Such expenditures should be included in the non-operating cash flows. Certain types of capital expenditures cannot be avoided even during most adverse conditions. They are necessary to maintain the minimum operating efficiency of the firm's resources. Such irreducible, minimum capital expenditures should be clearly identified.

Financial flows include interest, dividends, lease rentals, repayment of debt etc. They are further divided into: contractual obligations and policy obligations. **Contractual obligations** include those financial obligations, like interest, lease rentals and principal payments that are matters of contract, and should not be defaulted. **Policy obligations** consist of those financial obligations, like dividends, that are at the discretion of the board of directors. Policy obligations are also called **discretionary obligations**.

The cash flow analysis may indicate that a decline in sales, resulting in profit decline or losses, may not necessarily cause cash inadequacy. This may be so because cash may be realised from permanent inventory and receivable. Also, some of the permanent current liabilities may decline with fall in sales and profits. On the other hand, when sales and profits are growing, the firm may face cash inadequacy, as large amount of cash is needed to finance growing inventory and receivable. If the profits decline due to increase in expenses or falling output prices, instead of the decline in the number of units sold, the firm may face cash inadequacy because its funds in inventory and receivable will not be released. The point to be emphasised is that a firm should carry out cash flow analysis to get a clear picture of its ability to service debt obligations even under the adverse conditions, and thus, decide about the proper amount of debt. The firm must examine the impact of alternative debt policies on the firm's cash flow ability. The firm should then choose the debt policy, which it can implement.

Utility of cash flow analysis Is cash flow analysis superior to EBIT-EPS analysis? How does it incorporate the insights of the finance theory? The cash flow analysis has the following advantages:[27]

- It focuses on the *liquidity* and *solvency* of the firm over a long period of time, even encompassing adverse circumstances. Thus, it evaluates the firm's ability to meet fixed obligations.
- It is more *comprehensive* and goes beyond the analysis of profit and loss statement and also considers changes in the balance sheet items.
- It identifies *discretionary cash flows*. The firm can thus prepare an action plan to face adverse situations.
- It provides a list of *potential financial flows*, which can be utilised under emergency.
- It is a long-term *dynamic analysis* and does not remain confined to a single period analysis.

The most significant advantage of the cash flow analysis is that it provides a practical way of incorporating the insights of the finance theory. As per the theory, debt financing has tax advantage. But it also involves risk of financial distress. Therefore, the optimum amount of debt depends on the trade-off between tax advantage of debt and risk of financial distress. Financial distress occurs when the firm is not in a position to meet its contractual obligations. The cash flow analysis indicates when the firm will find it difficult to service its debt. Therefore, it is useful in providing good insights to determine the debt capacity, which helps to maximise the market value of the firm.

27. Donaldson, *op.cit.;* Solomon and Pringle, *op.cit.,* p. 489.

NOTES

Cash flow analysis versus debt-equity ratio The cash flow analysis might reveal that a higher debt–equity ratio is not risky if the company has the ability of generating substantial cash inflows in the future to meet its fixed financial obligations. Financial risk in this sense is indicated by the company's cash-flow ability, not by the debt-equity ratio. To quote Van Horne:[28]

> …the analysis of debt-to-equity ratios alone can be deceiving, and analysis of the magnitude and stability of cash-flows relative to fixed charges is extremely important in determining the appropriate capital structure for the firm. To the extent that creditors and investors analyse a firm's cash-flow ability to service debt, and management's risk preferences correspond to those of investors, capital structure decisions made in this basis should tend to maximise share price.

The cash-flow analysis does have its limitations. It is difficult to predict all possible factors, which may influence the firm's cash flows. Therefore, it is not a foolproof technique to determine the firm's debt policy.

5.8 PRACTICAL CONSIDERATIONS IN DETERMINING CAPITAL STRUCTURE

The determination of capital structure in practice involves additional considerations in addition to the concerns about EPS, value and cash flow. A firm may have enough debt servicing ability but it may not have assets to offer as collateral. Attitudes of firms with regard to financing decisions may also be quite often influenced by their desire of not losing control, maintaining operating flexibility and have convenient timing and cheaper means of raising funds. Some of the most important considerations are discussed below.

5.8.1 Assets

The forms of assets held by a company are important determinants of its capital structure. Tangible fixed assets serve as collateral to debt. In the event of financial distress, the lenders can access these assets and liquidate them to realise funds lent by them. Companies with higher tangible fixed assets will have less expected costs of financial distress and hence, higher debt ratios. On the other hand, those companies, whose primary assets are intangible assets, will not have much to offer by way of collateral and will have higher costs of financial distress. Companies have intangible assets in the form of human capital, relations with stakeholders, brands, reputation etc., and their values start eroding as the firm faces financial difficulties and its financial risk increases.

5.8.2 Growth Opportunities

The nature of growth opportunities has an important influence on a firm's financial leverage. Firms with high market-to-book value ratios have high growth opportunities. A substantial part of the value for these companies comes from organisational or intangible assets. These firms have a lot of investment opportunities. There is also higher threat of bankruptcy and high costs of financial distress associated with high growth firms once they start facing financial problems. These firms employ lower debt ratios to avoid the problem of under-investment and costs of financial distress. But bankruptcy is not the only time when debt-financed high-growth firms let go of the valuable investment opportunities. When faced with the possibility of interest default, managers tend to be risk averse and either put off major capital projects or cut down on R&D expenses or both. Therefore, firms with growth opportunities will probably find debt financing quite expensive in terms of high interest to be paid due to lack of good collateral and investment opportunities to be lost. High growth firms would prefer to take debts with lower maturities to keep interest rates down and to retain the financial flexibility since their performance can change unexpectedly any time. They would also prefer unsecured debt to have operating flexibility.

Check Your Progress

14. List the three most common approaches to decide about a firm's capital structure.
15. What is the advantage of cash flow analysis in arriving at a suitable capital structure?

28. Van Horne, James C., *Financial Management and Policy,* Prentice-Hall of India, 195, p. 290.

NOTES

Mature firms with low market-to-book value ratio and limited growth opportunities face the risk of managers spending free cash flow either in unprofitable maturing business or diversifying into risky businesses. Both these decisions are undesirable. This behaviour of managers can be controlled by high leverage that makes them more careful in utilising surplus cash. Mature firms have tangible assets and stable profits. They have low costs of financial distress. Hence these firms would raise debt with longer maturities as the interest rates will not be high for them and they have a lesser need of financial flexibility since their fortunes are not expected to shift suddenly. They can avail high interest tax shields by having high leverage ratios.

5.8.3 Debt- and Non-debt Tax Shields

We know that debt, due to interest deductibility, reduces the tax liability and increases the firm's after-tax free cash flows. In the absence of personal taxes, the interest tax shields increase the value of the firm. Generally, investors pay taxes on interest income but not on equity income. Hence, personal taxes reduce the tax advantage of debt over equity. The tax advantage of debt implies that firms will employ more debt to reduce tax liabilities and increase value. In practice, this is not always true as is evidenced from many empirical studies. Firms also have non-debt tax shields available to them. For example, firms can use depreciation, carry forward losses etc. to shield taxes. This implies that those firms that have larger non-debt tax shields would employ low debt, as they may not have sufficient taxable profit available to have the benefit of interest deductibility. However, there is a link between the non-debt tax shields and the debt tax shields since companies with higher depreciation would tend to have higher fixed assets, which serve as collateral against debt.

5.8.4 Financial Flexibility and Operating Strategy

A cash flow analysis might indicate that a firm could carry high level of debt without much threat of insolvency. But in practice, the firm may still make conservative use of debt since the future is uncertain and it is difficult to be able to consider all possible scenarios of adversity. It is, therefore, prudent to maintain **financial flexibility** that enables the firm to adjust to any change in the future events or forecasting error.

As discussed earlier, financial flexibility is a serious consideration in setting up the capital structure policy. Financial flexibility means a company's ability to adapt its capital structure to the needs of the changing conditions. The company should be able to raise funds, without undue delay and cost, whenever needed, to finance the profitable investments. It should also be in a position to redeem its debt whenever warranted by the future conditions. The financial plan of the company should be flexible enough to change the composition of the capital structure as warranted by the company's operating strategy and needs. It should also be able to substitute one form of financing for another to economise the use of funds. Flexibility depends on loan covenants, option to early retirement of loans and the financial slack, viz., excess resources at the command of the firm.

5.8.5 Loan Covenants

Restrictive covenants are commonly included in the long-term loan agreements and debentures. These restrictions curtail the company's freedom in dealing with the financial matters and put it in an inflexible position. Covenants in loan agreements may include restrictions to distribute cash dividends, to incur capital expenditure, to raise additional external finances or to maintain working capital at a particular level. The types of covenants restricting the firm's investment, financing and dividend policies vary depending on the source of debt. While private debt contains both affirmative and negative covenants, public debt has a lot of negative covenants and commercial paper does not entail much restrictions. Loan covenants may look quite reasonable from the lenders' point of view as they are meant to protect their interests, but they reduce the flexibility of the borrowing company to operate freely and it may become burdensome if conditions change. Growth firms prefer to take private rather than public debt since it is much easier to renegotiate terms in time of crisis with few private lenders than several debenture-holders. Generally, a company while issuing debentures or accepting other forms of debt should ensure to have

minimum of restrictive clauses that circumscribe its financial actions in the future in debt agreements. This is a tough task for the financial manager. A highly levered firm is subject to many constraints under debt covenants that restrict its choice of decisions, policies and programmes. Violation of covenants can have serious adverse consequences. The firm's ability to respond quickly to changing conditions also reduces. The operating inflexibility could prove to he very costly for the firms that are operating in unstable environment. These companies are likely to have low debt ratios and maintain high financial flexibility to remain competitive and not allow compromising their competitive posture. Thus, financial flexibility is essential to maintain the operating flexibility and face unanticipated contingencies.

5.8.6 Financial Slack

The financial flexibility of a firm depends on the **financial slack** it maintains. The financial slack includes unused debt capacity, excess liquid assets, unutilised lines of credit and access to various untapped sources of funds. The financial flexibility depends a lot on the company's debt capacity and **unused debt capacity**. The higher is the debt capacity of a firm and the higher is the unused debt capacity, the higher will be the degree of flexibility enjoyed by the firm. If a company borrows to the limit of its debt capacity, it will not be in a position to borrow additional funds to finance unforeseen and unpredictable demands except at restrictive and unfavourable terms. Therefore, a company should not borrow to the limit of its capacity, but keep available some unused capacity to raise funds in the future to meet some sudden demand for finances.[29]

Early repayment A considerable degree of flexibility will be introduced if a company has the discretion of early repaying its debt. This will enable management to retire or replace cheaper source of finance for the expensive one whenever warranted by the circumstances. When a company has excess cash and does not have profitable investment opportunities, it becomes desirable to retire debt. Similarly, a company can take advantage of declining rates of interest if it has a right to repay debt at its option. Suppose that funds are available at 12 per cent rate of interest presently. The company has outstanding debt at 16 per cent rate of interest. It can save in terms of interest cost if it can retire the 'old' debt and replace it by the 'new' debt.

Limits of financial flexibility Financial flexibility is useful, but the firm must understand its limit. It can help a profitable firm to seize opportunities, and it can provide temporary help in adverse situation, but it cannot save a firm, which is basically unhealthy. No doubt that financial flexibility is desirable, but the firm should have basic financial strength. Also, it is achieved at a cost. A company trying to obtain loans on easy terms will have to pay interest at a higher rate. Also, to obtain the right of refunding, it may have to compensate lenders by paying a higher interest or may have to allow them to participate in the equity. Therefore, the company should compare the benefits and costs of attaining the desired degree of flexibility and balance them properly.

5.8.7 Sustainability and Feasibility

The financing policy of a firm should be sustainable and feasible in the long run. Most firms want to maintain the sustainability of their financing policy over a long period of time. The **sustainable growth model** helps to analyse the sustainability and the feasibility of the long-term financial plans in achieving growth. This model is based on the assumption that the firm uses the internal financing and debt, consistent with the target debt-equity ratio and payout ratio and does not issue shares during the planning horizon. Given the firm's financing and payout policies and operating efficiency, this model implies that its assets and sales will grow in tandem with growth in equity (internal). Thus, the sustainable growth depends on return on equity (ROE) and retention ratio:

$$\text{Sustainable growth} = \text{ROE} \times (1 - \text{payout}) \quad (30)$$

ROE depends on assets turnover, net margin, and financial leverage:

ROE = asset turnover × net margin × leverage

$$\text{ROE} = \text{assets/sales} \times \text{net profit/sales} \times \text{assets/equity} \quad (31)$$

29. Solomon, E. and Pringle, *op.cit.*, p.490.

NOTES

Alternatively, ROE depends on the firm's before-tax return on capital employed (ROCE), the financial leverage premium and the tax rate:

$$ROE = [ROCE + (ROCE - k_d)\, D/E](1 - T) \quad (32)$$

The sustainable growth model indicates the growth rate that the firm should target. Any other growth rate will not be consistent with the financial policies set by the management. If the firm intends to achieve a different growth rate than that implied by the sustainable growth model, it will have to change its financial policy, either the debt-equity ratio, or the payout ratio or both. In fact, the model also indicates the trade-offs between the financing and operating policies. Instead of changing its financial policies for achieving higher growth, the firm can examine its operating policies vis-à-vis price, cost, assets utilisation etc. The firm must realise that growth does not ensure value creation. If the firm does not account for the investment duration and the cost of capital, growth may destroy value. The firm should also examine the impact of alternative financial policy on the value of the firm.

5.8.8 Control

In designing the capital structure, sometimes the existing management is governed by its desire to continue control over the company. This is particularly so in the case of the firms promoted by entrepreneurs. The existing management team not only wants control and ownership but also to manage the company, without any outside interference.

Widely held companies The ordinary shareholders elect the directors of the company. If the company issues new shares, there is risk of dilution of control. The company can issue rights shares to avoid dilution of ownership. But the existing shareholders may not be willing to fully subscribe to the issue. Dilution is not a very important consideration in the case of widely held companies. Most shareholders are not interested in taking active part in a company's management. Nor do they have time and money to attend the meetings. They are interested in dividends and capital gains. If they are not satisfied, they will sell their shares. Thus, the best way to ensure control and to have the confidence of the shareholders is to manage the company most efficiently and compensate shareholders in the form of dividends and capital gains. The risk of loss of control can be reduced by distribution of shares widely and in small lots.

Closely held companies The consideration of maintaining control may be significant in case of closely held and small companies. A shareholder or a group of shareholders can purchase all or most of the new shares of a small or closely held company and control it. Even if the owner-managers hold the majority shares, their freedom to manage the company will be curtailed when they go for initial public offerings (IPOs). Fear of sharing control and being interfered by others often delays the decision of the closely held small companies to go public. To avoid the risk of loss of control, small companies may slow their rate of growth or issue preference shares or raise debt capital. If the closely held companies can ensure a wide distribution of shares, they need not worry about the loss of control so much.

The holders of debt do not have voting rights. Therefore, it is suggested that a company should use debt to avoid the loss of control. However, when a company uses large amount of debt, a lot of restrictions are put by the debt-holders, specifically the financial institutions in India, since they are the major providers of loan capital to the companies. These restrictions curtail the freedom of the management to run the business. A very excessive amount of debt can also cause serious liquidity problem and ultimately render the company sick, which means a complete loss of control.

5.8.9 Marketability and Timing

Marketability means the readiness of investors to purchase a security in a given period of time and to demand reasonable return. Marketability does not influence the initial capital structure, but it is an important consideration to decide about the appropriate timing of security issues. The capital markets are changing continuously. At one time, the market favours debenture issues, and, at another time, it may readily accept share issues. Due to the changing market sentiments, the company has to decide whether to raise funds with an equity issue or a debt issue. The alternative methods of financing should, therefore, be evaluated in the light of general market conditions and the internal conditions of the company.

Capital market conditions If the capital market is depressed, a company will not issue equity shares, but it may issue debt and wait to issue equity shares till the share market revives. During boom period in the share market, it may be advantageous for the company to issue shares at high premium. This will help to keep its debt capacity unutilised. The internal conditions of a company may also dictate the marketability of securities. For example, a highly levered company may find it difficult to raise additional debt. Similarly, when restrictive covenants in existing debt-agreements preclude payment of dividends on equity shares, convertible debt may be the only source to raise additional funds. A small company may find difficulty in issuing any security in the market merely because of its small size. The heavy indebtedness, low payout, small size, low profitability, high degree of competition etc. cause low rating of the company, which would make it difficult for the company to raise external finance at favourable terms.

5.8.10 Issue Costs

Issue or **flotation costs** are incurred when the funds are externally raised. Generally, the cost of floating a debt is less than the cost of floating an equity issue. This may encourage companies to use debt than issue equity shares. Retained earnings do not involve flotation costs. The source of debt also influences the issue costs with fixed costs being much higher for issue of commercial paper and public debt (debenture) than the private debt. This also means that economies of scale are high for the debt instruments having high fixed costs. Hence these instruments should be used when large amounts of funds are needed. Issue costs as a percentage of funds raised will decline with larger amount of funds. Large firms require large amounts of funds, and they may plan large issues of securities to economise on the issue costs. These firms are more likely than others to resort to commercial paper or public debt for raising capital. A large issue of securities can, however, curtail a company's financial flexibility. The company should raise only that much of funds, which it can employ profitably. Many other more important factors have to be considered when deciding about the methods of financing and the size of a security issue.

5.8.11 Capacity of Raising Funds

The size of a company may influence its capital and availability of funds from different sources. A small company finds great difficulties in raising long-term loans. If it is able to obtain some long-term loan, it will be available at a higher rate of interest and inconvenient terms. The highly restrictive covenants in loan agreements in case of small companies make their capital structures very inflexible and management cannot run business freely without interference. Small companies, therefore, depend on share capital and retained earnings for their long-term funds requirements. It is quite difficult for small companies to raise share capital in the capital markets. Also, the capital base of most small companies is so small that they can not be listed on the stock exchanges. For those small companies, which are able to approach the capital markets, the cost of issuing shares is generally more than the large ones. Further, resorting frequently to ordinary share issues to raise long-term funds carries a greater risk of the possible loss of control for a small company. The shares of small companies are not widely scattered and the dissident group of shareholders can be easily organised to get control of the company. The small companies, therefore, sometimes limit the growth of their business to what can easily be financed by retaining the earnings.

A large company has relative flexibility in designing its capital structure. It can obtain loans on easy terms and sell ordinary shares, preference shares and debentures to the public. Because of the large size of issues, its cost of distributing a security is less than that for a small company. A large issue of ordinary shares can be widely distributed and thus, making the loss of control difficult. The size of the firm has an influence on the amount and the cost of funds, but it does not necessarily determine the pattern of financing. In practice, the debt-equity ratios of the firms do not have a definite relationship with their size.

Check Your Progress

16. What are some of the practical considerations in addition to EPS, value and cash flow analysis which decide a firm's capital structure?

5.9 MANAGER'S ATTITUDE TOWARDS DEBT

We know now the factors, which are theoretically important in determining the capital structure policy of a company. They are interest tax shield (adjusted for personal taxes) and costs of

NOTES

financial distress. We also know the additional factors in practice such as sales growth and stability, cash flow, market conditions, transaction costs etc. which may have influence on the choice of capital structure. How do managers really view the question of borrowing? There seems to be a mixed feeling. Some would prefer borrowing while others would like to decide after considering a variety of factors. They also feel that they can borrow only when lenders are prepared to lend. They think that lenders evaluate a number of factors before deciding to lend, and these factors go beyond the theoretical considerations of risk, return and value. Exhibit 5.3 summarises the perceptions of managers vis-à-vis borrowing.

EXHIBIT 5.3: DO MANAGERS PREFER BORROWING?

- A number of companies in practice prefer to borrow for the following reasons:
  - Tax deductibility of interest
  - Higher return to shareholders due to gearing
  - Complicated procedure for raising equity capital
  - No dilution of ownership and control
  - Equity results in a permanent commitment than debt.
- There are, however, managers whose choice of financing depends on internal and external factors. The internal factors include: purpose of financing, company's earning capacity, existing capital structure, cash flow ability, investment plans etc. The external factors are: capital and money market conditions, debt-equity stipulations followed by financiers, restrictions imposed etc. A company, for example, feels: "There can be no specific preference towards borrowings as a source of finance. The company's financial requirement will vary from time to time depending on factors such as its existing capital structure, investment plans vis-a-vis expansion, modernisation and replacement as also its margin money requirement for incremental working capital. In addition, the cost of share issue, existing money market and banking conditions and the impact of statutory regulations would influence the mix of finance required by a company."
- In practice, it may not be possible for a company to borrow whenever it wants. Lenders may analyse a number of characteristics of the borrower before they decide to lend. What factors do borrowers think are considered by lenders? Borrowing firms' managers perceive the following factors in order of importance being considered by lenders: (*i*) profitability, (*ii*) quality of management, (*iii*) security, (*iv*) liquidity, (*v*) existing debt-equity ratio, (*vi*) sales growth, (*vii*) net worth, (*viii*) reserve position, and (*ix*) fluctuations in profits.

Source: Pandey, I.M., Financing Decisions: A Survey of Management Understanding, *Economic & Political Weekly*, Feb. 1984.

5.10 CAPITAL STRUCTURE ANALYSIS OF L&T LIMITED

In this section, we shall analyse the capital structure of L&T. We introduced L&T in Chapter 9. L&T is a large diversified company in the private sector. In 2003, it had a total sales of Rs 8,783 crore and gross fixed assets of Rs 6,305 crore. Table 5.11 provides data about L&T's debt-equity ratio, interest coverage, interest as a percentage of sales and average share price for the period from 1990 to 2003. L&T's debt-equity ratio shows a fluctuating pattern during this period. From a high level of 2.5 in 1990, it has significantly reduced to a very low level of 0.20 in 1993. The ratio started increasing gradually and was close to 1 in 2003 (Fig. 5.7).

L&T's interest coverage ratio has been more than 3.0 times except during 1990-92 and 2000-2002. (Figure 5.8). Thus, the company has been maintaining a good debt-servicing ability and has also been employing debt to take advantage of interest tax shield. Interest, as a percentage of sales, was quite high in the beginning of the nineties and during 2000-02 but it has reduced to about 3 per cent of sales in 2003.

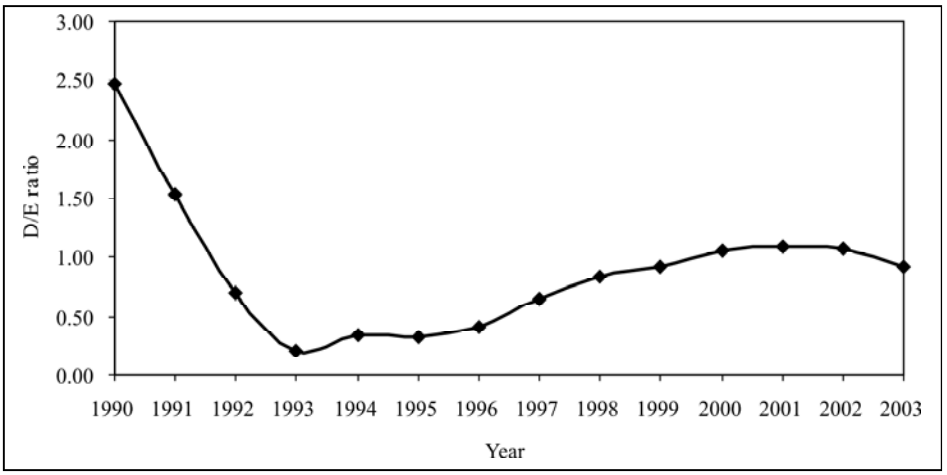


Figure 5.7: L&T's debt-equity ratio, 1990–2003

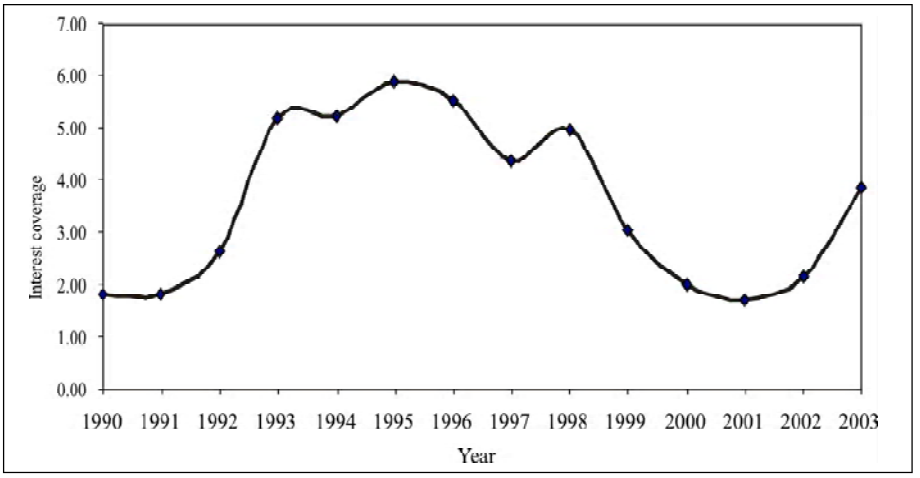


Figure 5.8: L&T's interest coverage ratio, 1990–2003

Table 5.8: L&T's Debt-Equity Ratio and Other Financial Data

Year	*D/E ratio*	*D/E index*	*Interest Coverage*	*Interest to Sales Ratio*	*AMP*	*AMP Index*
1990	2.46	100.00	1.81	7.92	71.00	100.00
1991	1.53	100.62	1.82	7.73	122.50	172.54
1992	0.70	145.52	2.63	6.43	245.00	345.07
1993	0.20	287.62	5.19	2.26	287.50	404.93
1994	0.34	288.35	5.21	2.15	240.00	338.03
1995	0.32	325.12	5.87	2.35	268.75	378.52
1996	0.40	305.01	5.51	2.58	262.00	369.01
1997	0.65	242.48	4.38	3.16	253.00	356.34
1998	0.84	274.36	4.96	2.35	230.00	323.94
1999	0.92	167.18	3.02	3.39	211.25	297.54
2000	1.05	109.81	1.98	5.37	397.73	560.18
2001	1.09	93.86	1.70	6.14	232.08	326.87
2002	1.07	119.26	2.15	4.62	201.28	283.49
2003	0.92	213.23	3.85	2.56	182.80	257.46

NOTES

How have L&T's share price and debt-equity ratio moved? From 1990 to 1998, L&T's share price and debt-equity ratio have moved in tandem and have shown increasing trend. However, they seem to have moved in opposite direction during 1998-2003. (Figure5.9 and columns 6 and 7 in Table 5.8). Figure 5.9 shows that in the recent years, L&T's debt-equity ratio has been increasing while the share price has been declining.

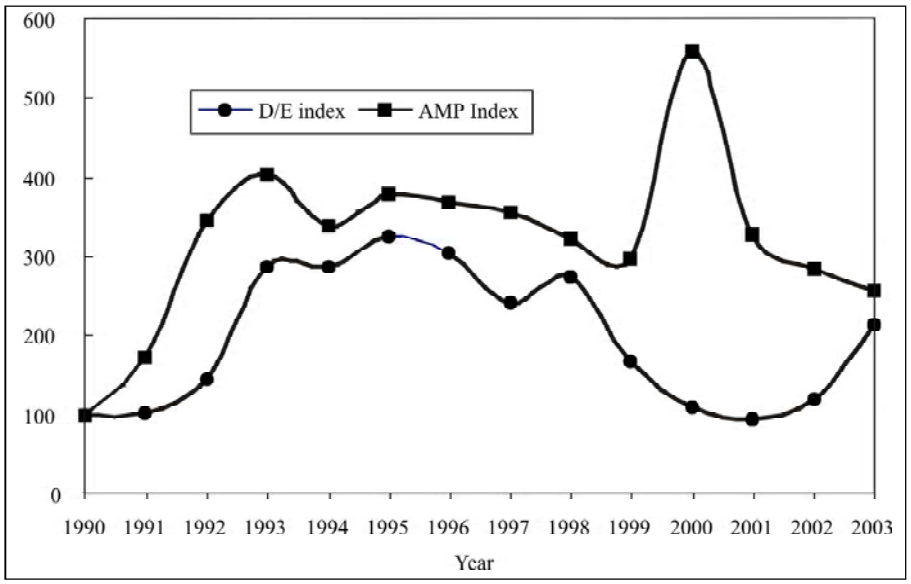


Figure 5.9: L&T's share price and debt-equity indices

L&T has borrowed funds from various sources. Long-term sources provide more than 70 per cent of total debt. Its long-terms sources include debentures, borrowings from banks and financial institutions and other sources such as public deposits etc. For financing its net current assets, the company has mostly used bank borrowing. L&T's short-term borrowings come from banks and commercial paper. In the last few years the company has reduced its borrowing from financial institutions and is using banks borrowings and debentures for financing its investments. (Table 5.9).

Table 5.9: L&T's Sources and Uses of Funds%

				STD			*LTD*		
Year	***Debt***	***LTD***	***STD***	***STBB***	***CP***	***LTBB***	***FIB***	***Deb.***	***OLTB***
1990	100	84.28	15.72	100.00	0.00	4.91	4.38	78.61	12.10
1991	100	95.21	4.79	100.00	0.00	9.17	2.83	77.90	10.10
1992	100	89.70	10.30	100.00	0.00	11.13	2.24	75.58	11.04
1993	100	47.28	52.72	100.00	0.00	44.90	5.04	13.45	36.60
1994	100	60.93	39.07	100.00	0.00	32.40	38.56	2.80	26.23
1995	100	51.48	48.52	100.00	0.00	55.78	21.52	0.39	22.31
1996	100	61.58	38.42	100.00	0.00	62.88	18.76	0.14	18.22
1997	100	77.11	22.89	93.50	6.50	34.85	19.78	33.28	12.08
1998	100	79.85	20.15	82.56	17.44	30.30	14.99	41.20	13.52
1999	100	78.19	21.81	42.48	57.52	26.15	10.20	48.10	15.55
2000	100	70.62	29.38	69.57	30.43	21.20	9.46	57.73	11.61
2001	100	67.80	32.20	60.47	39.53	21.67	6.57	63.35	8.41
2002	100	75.86	24.14	62.39	37.61	30.65	2.88	53.35	13.12
2003	100	72.80	27.20	88.46	11.54	30.07	2.27	52.63	15.04

Note: LTD = long-term debt; STD = short-term debt; STBB = short-term bank borrowings; CP = commercial paper; LTBB = long-term bank borrowings; FIB = borrowings from financial institutions; Deb. = debentures; OLTB = other long-term borrowings.
Source: CMIE Database.

L&T has a history of heavily relying on internal funds and equity issues until 1980. The company made substantial use of debt during eighties and the beginning of nineties. A large part of long-term was raised through convertible debentures. The company has strengthened its equity base by converting its debentures into equity as well as retaining about 60 per cent of its profit. At the end of 2003, L&T has a total debt-equity ratio of 0.92. The debt includes both short-term and long-term debt. It has a strong coverage ratio. Thus, the company has strong financial capability and will be able to raise debt and equity funds for its future growth.

5.11 LET US SUMMARIZE

- The capital structure decision of the firm can be characterised as a choice of that combination of debt and equity, which maximises the market value of the firm.
- According to Modigliani and Miller's (MM's) Proposition I, the firm's market value is not affected by capital structure; that is, any combination of debt and equity is as good as any other.
- Firms borrow by offering investors various types of securities. In MM's world of perfect capital market, because of same borrowing and lending rates for all investors and no taxes, investors can borrow at their own. Why should they pay a premium for a firm's borrowing?
- MM accept that borrowing increases shareholders return, but they argue, it also increases financial risk. They show that increased financial risk via increased cost of equity exactly offsets the increased return; thus leaving the position of shareholders unchanged. This is MM's Proposition II.
- As against MM's hypothesis, the traditionalists argue that market imperfections make borrowing by individual investors costly, risky and inconvenient.
- The arbitrage envisaged by MM will not work because of market imperfections, and investors may be willing to pay a premium for shares of levered firms. But thousands of the levered firms would have already satisfied the demand of investors who like their shares. Therefore, a firm changing its debt policy is unlikely to influence the market value of the firm.
- One unrealistic assumption of MM's hypothesis is that, they assume no existence of taxes. When corporate taxes are assumed, firms can increase earnings of all investors through borrowing which results in interest tax shield. The value of perpetual interest tax shield (PVINTS) is equal to *TD*:

$$\text{PVINTS} = \frac{T(k_d D)}{k_d} = TD$$

  where T is the corporate tax rate, k_d is the cost of debt and D is the amount of debt.
- Thus the market value of the levered firm will be equal to the market value of an all-equity or unlevered firm (V_u) plus the present value of interest tax shield (TD);

$$V_1 = V_u + TD$$

  This equation implies that a firm can continuously increase its value by borrowing more debt. Thus firms should have 100 per cent debt in their capital structures.

  In practice, we do not find all firms using high amounts of debt. One explanation for this behaviour could be personal income taxes.
- Miller has propounded a theory incorporating both corporate and personal income taxes. According to him, the advantage of interest tax shield is offset by the personal taxes paid by debt-holders on interest income.
- Interest income is tax-exempt at corporate level while dividend income is not. Interest income is taxed at personal level while dividend income may largely escape personal taxes.

NOTES

- Thus companies can induce tax-paying investors to buy debt securities if they are offered high rate of interest. But after a stage it will not be possible to attract investors in the high-tax brackets. This point establishes the optimum debt ratio for the individual firms.
- It is difficult to believe that corporate borrowing is not at all beneficial to the firms. In reality, personal taxes on dividend income may not be zero in all countries. Also, there are always investors in different tax brackets. Thus, the tax advantage of corporate borrowing is partly taken away by the lost personal taxes.
- Financial distress becomes costly when the firm finds it difficult to pay interest and principal. From this point of view, both debt ratio and EBIT-EPS analysis have their limitations. They do not reflect the debt-servicing ability of the firm.
- A full cash flow analysis over a long period, which covers the adverse situation also, helps to determine the firm's debt capacity.
- Debt capacity means the amount of debt, which a firm should use given its cash flows. Cash flow analysis indicates how much debt a firm can service without any difficulty.
- A firm does not exhaust its debt capacity at once. It keeps reserve debt capacity to meet financial emergencies.
- The actual amount of debt also depends on flexibility, control and size of the firm in terms of its assets.
- Other factors, which are important when capital is actually raised, include timing (marketability) and flotation costs.

5.12 KEY CONCEPTS

Cash inadequacy
Cost of equity
Financial distress
Growth opportunities
Information asymmetry
Net operating income approach
Over-investment
Personal leverage
Target capital structure
Under-investment
Arbitrage
Corporate leverage
Debt capacity
Financial flexibility
Homemade leverage
Interest tax shield
Non-operating cash flows
Policy obligations
Weighted average cost of capital
Capitalisation rate
Cost of debt
Discretionary obligations
Flotation costs
Homogeneous risk class
Net income approach
Optimum capital structure
Perfect capital markets
Signalling
Traditional approach

5.13 ILLUSTRATIVE SOLVED PROBLEMS

Problem 5.1: Kelley Manufacturing Co. has a total capitalisation of Rs 1,000,000, and it normally earns Rs 100,000 (before interest and taxes). The financial manager of the firm wants to take a decision regarding the capital structure. After a study of the capital market, he gathers the following data:

(*a*) What amount of debt should be employed by the firm if the traditional approach is held valid?

(*b*) If the Modigliani-Miller approach is followed, what should be the equity capitalisation rate?

Assume that corporate taxes do not exist, and that the firm always maintains its capital structure at book values.

Amount of Debt Rs	*Interest Rate %*	*Equity Capitalisation Rate % (at given level of debt)*
0	—	10.00
100,000	4.0	10.50
200,000	4.0	11.00
300,000	4.5	11.60
400,000	5.0	12.40
500,000	5.5	13.50
600,000	6.0	16.00
700,000	8.0	20.00

Solution:

(*a*) As per the traditional approach, optimum capital structure exists when the weighted average cost of capital is minimum. The weighted average cost of capital calculations at book value weights are as follows:

The firm should employ debt of Rs 400,000 as the weighted average cost of capital is minimum at this level of debt.

(*b*) According to the M-M approach, the cost of capital is a constant, and the cost of equity increases linearly with debt. The equilibrium cost of capital is assumed to be equal to pure equity capitalisation rate, which is 10 per cent in the present problem. The equity capitalisation rate is given by the following formula:

k_e *(1)*	w_e *(2)*	k_d *(3)*	w_d *(4)*	$k_e w_e$ *(5)*	$k_d w_d$ *(6)*	k_o *(7) = (5) + (6)*
0.100	1.0	—	—	0.1000	—	0.1000
0.105	0.9	0.040	0.1	0.0945	0.0040	0.0985
0.110	0.8	0.040	0.2	0.0880	0.0080	0.0960
0.116	0.7	0.045	0.3	0.0812	0.0135	0.0947
0.124	0.6	0.050	0.4	0.0744	0.0200	0.0944
0.135	0.5	0.055	0.5	0.0675	0.0275	0.0950
0.160	0.4	0.060	0.6	0.0640	0.0360	0.1000
0.200	0.3	0.080	0.7	0.0600	0.0560	0.1160

The equity capitalisation rates are shown in the following table.

Problem 5.2: The Levered Company and the Unlevered Company are indentical in every respect except that the Levered Company has 6 per cent Rs 200,000 debt outstanding. As per the NI approach, the valuation of the two firms is as follows:

	Unlevered Co. Rs	*Levered Co. Rs*
Net operating income $\overline{X}$	60,000	60,000
Total cost of debt, $k_d D$	0	12,000
Net earnings, *NI*	60,000	48,000
Equity capitalisation rate, k_e	0.100	0.111
Market value of shares, *E*	600,000	432,000
Market value of debt, *D*	0	200,000
Total value of the firm, *V*	600,000	632,000

Mr *X* holds Rs 2,000 worth of the Levered Company's shares. Is it possible for Mr *X* to reduce his outlay to earn same return through the use of arbitrage? Illustrate.

NOTES

Solution:

Through arbitrage it is possible for Mr *X* to reduce his outlay and earn the same return.

1. Mr *X* would sell his shares in the Levered Company for Rs 2,000.
2. He would create a personal leverage equal to his share of debt in the Levered Company by borrowing Rs 926 (= Rs 2,000 × Rs 200,000/Rs 432,000).
3. He would buy Rs 2,778 (= Rs 600,000 × Rs 2,000/Rs 432,000) of the Unlevered Company's shares.

   His return is:

Return on the Unlevered Co.'s shares: Rs 2,778 ×10%	Rs 277.80
Less: Interest, Rs 926 × 6%	55.56
Net return	Rs 222.24

His return from the Levered Co. is Rs 2,000 × 11.1% = Rs 222.22, same as in the Unlevered Co. However, the funds involved in the Unlevered Co. are Rs 2,778 – Rs 926 = Rs 1,852 which is less than Rs 2,000 cash outlay involved in the Levered Company.

Problem 5.3: Firms *A* and *B* are similar except that *A* is unlevered, while *B* has Rs 200,000 of 5 per cent debentures outstanding. Assume that the tax rate is 40 per cent; NOI is Rs 40,000 and the cost of equity is 10 per cent. (*i*) Calculate the value of the firms, if the *M-M* assumptions are met. (*ii*) Suppose V_B = Rs 360,000. According to *M-M*, do these represent equilibrium values? How will equilibrium be set? Explain.

Solution: (*i*) The value of the unlevered firm is:

$$V_A = \frac{(1-T)\,\bar{X}}{k} = \frac{(1-0.4)\text{ Rs }40{,}000}{0.10} = \text{Rs }240{,}000$$

The value of the levered firm is:

$$V_B = V_A + TD = \text{Rs }240{,}000 + 0.4 \text{ of Rs }200{,}000$$
$$= \text{Rs }240{,}000 + \text{Rs }80{,}000 = \text{Rs }320{,}000$$

(*ii*) These do not represent the equilibrium values. Firm *B* is overvalued by Rs 40,000 (= Rs 360,000 – Rs 320,000). The arbitrage process with taxes will work as follows to restore equilibrium.

Assume an investor owns 10 per cent of *B* Co.'s shares. His investment is:

$$0.10 \times (\text{Rs }360{,}000 - \text{Rs }200{,}000) = 0.10 \times \text{Rs }160{,}000$$
$$= \text{Rs }16{,}000$$

and return is

$$0.10 \times [(\text{Rs }40{,}000 - \text{Rs}10{,}000)(1-0.4)] = 0.10 \times \text{Rs }18{,}000$$
$$= \text{Rs }1{,}800$$

Table 5.10: Equity Capitalisation Rates

Debt (Rs)	k_d	k_o		$(k_o - k_d)$	*Debt/Equity*		k_e
0	—	0.10	+	(0.10 – 0.000)	0	=	0.1000
100,000	0.040	0.10	+	(0.10 – 0.040)	100,000 / 900,000	=	0.1067
200,000	0.040	0.10	+	(0.10 – 0.040)	200,000 / 800,000	=	0.1150
300,000	0.040	0.10	+	(0.10 – 0.045)	300,000 / 700,000	=	0.1236
400,000	0.050	0.10	+	(0.10 – 0.050)	400,000 / 600,000	=	0.1333
500,000	0.050	0.10	+	(0.10 – 0.055)	500,000 / 500,000	=	0.1450
600,000	0.060	0.10	+	(0.10 – 0.060)	600,000 / 400,000	=	0.1600
700,000	0.080	0.10	+	(0.10 – 0.080)	700,000 / 300,000	=	0.1467

The investor can get the same income by shifting his investment to *A* Co. He would sell his holdings in *B* Co. for Rs 16,000 and borrow on personal account Rs 12,000, which is his percentage holdings in *B* Co.'s debt *i.e.*, 0.10 (1 – 0.4) Rs 200,000 = Rs 12,000. He would, then, purchase 10 per cent of A Co.'s shares: 0.10 × Rs 2,40,000 = 24,000. His return and outlay would be

	Rs
Return 0.10[(1 – 0.4) Rs 40,000]	2,400
Less: Cost of personal debt 0.05 × Rs 12,000	600
Net return	1,800
Total funds available at his disposal:	
From sale of *B* Co.'s shares	16,000
Borrowed funds	12,000
	28,000
Total cash outlay in *A* Co.'s shares	24,000
Uncommitted funds	4,000

Through arbitrage and the substitution of personal for corporate leverage, the investor can switch from *B* Company to *A* Company, earn the same total return of Rs 1,800, and have funds left over to invest elsewhere. This process would continue till the equilibrium is restored.

Problem 5.4: The following are the costs and values for the firms *A* and *B* according to the traditional approach:

	A ***Rs***	***B*** ***Rs***
Total value of firm, V	50,000	60,000
Market value of debt, D	0	30,000
Market value of equity, E	50,000	30,000
Expected net operating income	5,000	5,000
Cost of debt, INT = $k_d D$	0	1,800
Net income, NOI – $k_d D$	5,000	3,200
Cost of equity, $k_e = (- k_d D)/E$	10.00%	10.70%
Debt-equity ratio, D/E	0	0.5
Average cost of capital, k_o	10.00%	8.33%

Compute the equilibrium value for Firms *A* and *B* in accordance with the M-M thesis. Assume that (*i*) taxes do not exist and (*ii*) the equilibrium value of k_o is 9.09 per cent.

Solution: The equilibrium values are shown below:

	A ***Rs***	***B*** ***Rs***
Expected net operating income, $\overline{X}$	5,000	5,000
Total cost of debt, INT = $k_d D$	0	1,800
Net income, $\overline{X} - k_d D$	5,000	3,200
Average cost of capital, k_o	0.909	0.909
Total value of firm, $V = \overline{X}/k_o$	55,000	55,000
Market value of debt, D	0	30,000
Market value of shares, $S = V - D$	55,000	25,000
Cost of equity, $k_e = (\overline{X} - k_d D)/S$	0.909	0.128

NOTES

5.14 ANSWERS TO 'CHECK YOUR PROGRESS'

1. A levered firm uses both equity and debt for financing its assets. On the other hand, an unlevered firm finances its assets only through equity.
2. Under the net income approach, the value of the firm is the sum of the value of the equity and the value of debt. The value of equity may be defined as the discounted value of net income, that is net income (net operating income minus interest) divided by cost of equity. The value of debt is the discounted value of interest, that is interest amount divided by the cost of debt.
3. A firm's overall cost of capital is the weighted average cost of capital of all the firm's securities. Therefore, the firm's weighted average cost of capital is the weighted average of the cost of equity and the cost of debt.
4. This will be possible if the firm under consideration operates in a frictionless world. In such a world, there are no transaction costs and debt is risk free with shareholders perceiving no financial risk arising from the use of debt. Since debt is a cheaper source of finance than equity, the firm's weighted average cost of capital will decline with financial leverage.
5. The traditional view is a compromise to the extreme position taken by the net income approach. According to the traditional view, a judicious mix of debt and equity can increase the value of the firm by reducing the weighted average cost of capital (WACC) up to a certain level of debt. Once this optimum level has been reached, a further increase of debt will lead to an increase in WACC. This is because as the leverage is increased, the shareholders start expecting a higher risk premium in the form of increasing cost of equity until a point is reached when the advantage of lower cost debt is more than offset by more expensive equity.
6. The MM view differs from the traditional view. The theory states that, assuming perfect capital markets without taxes and transaction costs, a firm's market value and the cost of capital do not change as the capital structure changes. This is because the value of the firm depends on its earnings (net operating income) and the risk of its assets (business risk) rather than the way in which the assets have been financed.
7. MM's approach is a net operating income approach as the value of the firm is the capitalized value of net operating income. Both net operating income and the firm's opportunity cost of capital are assumed to remain constant with changing financial leverage. MM's Proposition I basically assumes that two firms which belong to the same industry and face similar competitive and business conditions, have the same net operating income. Since the values of the levered and unlevered firms and the expected net operating income do not change with financial leverage, the weighted average cost of capital also does not change with financial leverage.
8. The key assumptions are perfect capital markets, homogeneous risk classes, the operating risk is defined in terms of the variability of the net operating income (NOI), no corporate taxes (implying that interest payable on debt do not save taxes), and that firms follow a system of 100 per cent dividend payout.
9. Financial leverage does not affect a firm's net operating income, but it does affect shareholders' return (EPS and ROE). EPS and ROE increase with leverage when the interest rate is less than the firm's return on assets. However, financial leverage also increases shareholders' financial risk by amplifying the variability of EPS and ROE. Thus financial leverage causes two opposing effects; it increases the shareholders' return but it also increases the financial risk. Shareholders will increase the required rate of return (i.e. the cost of equity) on their investment in order to compensate for the increased financial risk. The higher the financial risk, the higher the shareholders' required rate of return or the cost of equity. This is MM's Proposition II.
10. The main criticism is the unrealistic assumption of perfect capital markets in which arbitrage is expected to work. Traditionalists argue that market imperfections make borrowing by individual investors risky, costly and inconvenient. Thus the arbitrage process may fail to work and may give rise to discrepancy between the market values of levered and unlevered firms.
11. Once we introduce tax deductibility of interest charges as applicable to corporate taxes, a firm can increase its value with leverage. This would imply that the optimum capital structure

is reached when the firm employs almost 100 per cent debt. However, this is not observed in reality. In practice, firms do not employ large amounts of debt, nor are lenders ready to lend beyond certain limits. MM suggests that firms would adopt a target debt ratio so as not to violate the limits of the debt levels imposed by lenders.

12. Theoretically, the optimum capital structure is one that maximises the market value of the firm. In practice, a number of factors influence the capital structuring decision. Usually the board of directors or the chief financial officer of a company develops an appropriate target capital structure that is most advantageous to the company. The capital structure decision depends upon factors like acceptable leverage, flexibility, solvency, norms set by lending agencies and guidelines of the stock market regulator and stock exchanges.
13. FRICT stands for Flexibility, Risk, Income, Control and Timing. All these factors should be considered by the management of the company while evaluating a firm's appropriate capital structure.
14. The three most common approaches to firming up a company's capital structure are: (i) EBIT-EPS approach which analyses the impact of debt on shareholders' return and risk; (ii) Valuation approach for determining the impact of debt on shareholders' value; and (iii) Cash flow approach in order to analyse the firm's ability to service debt and avoid financial distress.
15. Cash flow analysis focuses on the liquidity and solvency of the firm over a long period of time. It is comprehensive and goes beyond the profit and loss statement. It can consider various alternative capital structures and arrive at an optimum one, given a company's projected cash flows.
16. Some important factors which may determine a firm's capital structure are: (i) availability of assets to offer as collateral security to the lender; (ii) nature of growth opportunities; (iii) availability of both debt and non-debt (say depreciation) tax shields; (iv) restrictive loan covenants; (v) the firm's debt capacity and unused debt capacity; (vi) maintaining existing control and ownership; (vii) marketability and timing of fresh issues of security; (viii) issue or floatation costs of various types of securities; and (xi) the capacity and size of the firm to raise funds from various sources.

5.15 QUESTIONS AND EXERCISES

Review Questions

1. Explain the assumptions and implications of the NI approach and the NOI approach. Illustrate your answer with hypothetical examples.
2. Describe the traditional view on the optimum capital structure. Compare and contrast this view with the NOI approach and the NI approach.
3. Explain the position of M-M on the issue of an optimum capital structure, ignoring the corporate income taxes. Use an illustration to show how home-made leverage by an individual investor can replicate the same risk and return as provided by the levered firm.
4. Assuming the existence of the corporate income taxes, describe M–M's position on the issue of an optimum capital structure.
5. 'The M-M thesis is based on unrealistic assumptions.' Evaluate the reality of the assumptions made by M-M.
6. How does the cost of the equity behave with leverage under the traditional view and the M–M position?
7. Consider two firms, *L* and *U*, that are identical except that *L* is levered whereas *U* is unlevered. Let V_l and V_u stand respectively, for the market values of *L* and *U*. In a perfect market, would one expect V_u to be less than, greater than, or equal to V_l? Explain.
8. "When the corporate income taxes are assumed to exist, Modigliani and Miller and the traditional theorists agree that capital structure does affect value, so the basic point of dispute disappears." Do you agree? Why or why not?
9. Define the capital structure. What are the elements of a capital structure? What do you mean by an appropriate capital structure? What are the features of an appropriate capital structure?

NOTES

10. Briefly explain the factors that influence the planning of the capital structure in practice.
11. Explain the features and limitations of three approaches of determining a firm's capital structure: (*a*) EBIT – EPS approach, (*b*) valuation approach, and (*c*) cash flow approach.
12. "...the analysis of debt-to-equity ratios alone can be deceiving, and an analysis of the magnitude and stability of cash-flows relative to fixed changes is extremely important in determining the appropriate capital structure—." Give your opinion.
13. What are the implications of growth opportunities for the financial leverage?
14. What is meant by financial flexibility? Is a flexible capital structure costly?
15. What is the importance of marketability and floatation costs in the capital structure decision of a company?
16. How do the considerations of control and size affect the capital structure decision of the firm?

Problems

1. *X* Co. has a net operating income of Rs 200,000 on an investment of Rs 1,000,000 in assets. It can raise debt at a 16 per cent rate of interest. Assume that taxes do not exist.
   (*a*) Using the NI approach and an equity-capitalisation rate of 18 per cent, compute the total value of the firm and the weighted average cost of capital if the firm has (*i*) no debt, (*ii*) Rs 300,000 debt, (*iii*) Rs 600,000 debt.
   (*b*) Using the NOI approach and an overall capitalisation rate of 12 per cent, compute the total value of the firm, value of shares and the cost of equity if the firm has (*i*) no debt, (*ii*) Rs 300,000 debt, (*iii*) Rs 600,000 debt.
2. Firm *L* and Firm *U* are in the same risk class and are identical in every respect except that Firm *L* is levered and Firm *U* is unlevered. Firm *L* has 12 per cent Rs 400,000 debentures outstanding. Both firms earn 18 per cent before interest and taxes on their total assets of Rs 800,000. Assume a corporate tax rate of 50 per cent and a pure equity capitalisation rate of 15 per cent.
   (*a*) Compute the total value of the firms using (*i*) the NI approach, (*ii*) the NOI approach.
   (*b*) Using the NOI approach, calculate the after-tax weighted average cost of capital for both the firms. Which of the two firms has an optimum capital structure and why?
   (*c*) According to the NOI approach, the values for Firms *A* and *B* computed in part (*a*) using the NI approach are not in equilibrium. Under such a situation, an investor can secure same return at lower cash outlay through the arbitrage process. Assume that an investor owns 5 per cent of *L*'s shares, show the arbitrage process. When would this arbitrage process stop?
3. The values for two firms *X* — an unlevered firm and *Y*—a levered firm with Rs 600,000 debt at 6 per cent rate of interest are given as below. An investor holds Rs 20,000 worth of *Y*'s shares. Show the process by which he can earn same return at a lesser cost.

	X ***Rs***	***Y*** ***Rs***
Net operating income $\overline{X}$,	200,000	200,000
Cost of debt, INT = k_d *D*	—	36,000
Net income, NI	200,000	164,000
Equity-capitalisation rate, k_e	0.111	0.125
Market value of equity, *E*	1,800,000	1,312,000
Market value of debt, *D*	—	600,000
Total value of firm, *V* = *E* + *D*	1,800,000	1,912,000
Overall capitalisation rate, k_o	0.1111	0.1046

4. Two firms *A* and *B* are identical in all respect except that *B* has Rs 500,000 debt outstanding at a 6 per cent rate of interest. The values of the two

NOTES

	A Rs	*B* Rs
Net operating income $\overline{X}$	150,000	150,000
Cost of debt, k_d	—	30,000
Net income NI	150,000	120,000
Equity-capitalisation rate, k_e	0.10	0.15
Market value of equity, E	1,500,000	800,000
Market value of debt, D	—	500,000
Total value of firm, $V = E + D$	1,500,000	1,300,000
Overall capitalisation rate, k_e	0.10	0.1154

Assume that an investor owns 10 per cent of *A*'s shares. How can the investor obtain same return at a lower cost?

5. Sppose X = Rs 50,000, k_d = 0.06, $E_u = V_u$ = Rs 500,000, E_l = Rs 280,000. D_l = Rs 250,000 and $V_l = D_l + E_l$ = Rs 530,000. Calculate the cost of equity and the weighted average cost of capital for two firms. If an investor owns 5 per cent of the levered firm's shares, how can he be benefited by resorting to the arbitrage process?

6. A new company proposes to invest Rs 10 lakh in assets and will maintain its capital structure at book value. It is expected to earn a net operating income of Rs 160,000. The company wants to have an optimum mix of debt and equity. The cost of debt and the equity-capitalisation rate at different debt-equity ratio are as follows:

   (*a*) What is the optimum capital structure for this company?

   (*b*) If the M-M hypothesis is valid, what should be the equity-capitalisation rate at different debt-equity ratios?

Debt-Equity Ratio	*Cost of Debt*	*Equity-capitalisation Rate*
—	—	0.125
10: 90	0.05	0.130
20: 80	0.05	0.136
30: 70	0.06	0.143
40: 60	0.07	0.160
50: 50	0.08	0.180
60: 40	0.10	0.200

7. The values for the two firms X and Y in accordance with the traditional theory are given below:

	X Rs	*Y* Rs
Expected net operating income, $\overline{X}$	50,000	50,000
Total cost of debt, $k_d D$ = INT	0	10,000
Net income, $\overline{X}$ – INT	50,000	40,000
Cost of equity, k_e	0.10	0.11
Market value of shares, E	500,000	360,000
Market value of debt, D	0	200,000
Total value of firm, $V = E + D$	500,000	560,000
Average cost of capital, $k_o = X/V$	0.10	0.09
Debt–equity ratio	0	0.556

Compute the values for firms X and Y as per the M-M thesis. Assume that (*i*) corporate income taxes do not exist and (*ii*) the equilibrium value of k_o is 12.5 per cent.

NOTES

8. The following are the equilibrium value for two firms *M* and *N* as per the Modigliani-Miller approach:

	M Rs	*N Rs*
Net operating income $\overline{X}$,	12,000	12,000
Total cost of debt, INT = k_d *D*	0	2,000
Net income, $\overline{X}$ – INT	12,000	10,000
Overall capitalisation rate, k_o	0.08	0.08
Total value of firm, $V = X/k_o$	1,50,000	1,50,000
Market value of debt, *D*	0	40,000
Market value of shares, $E = V - D$	1,50,000	1,10,000
Cost of debt, k_d = INT/*D*	0	0.05
Cost of equity, $k_e = (\overline{X}$ – INT)/*E*	0.08	0.091

Recompute the values for firms *M* and *N* in accordance with the traditional theory. Assume that the cost of equity of firm *M* is 10 per cent and for firm *N* it is 10.5 per cent.

9. Firm *L* and *U* have same expected earnings before interest and taxes of Rs 25,000. Firm *U* has employed 100 per cent equity of Rs 100,000 while firm *L* has employed Rs 50,000 equity and Rs 50,000 debt at an expected rate of return (cost of debt) of 15 per cent. You are required to calculate for each firm: (*a*) earnings of all investors and (*b*) value of interest tax shield under the following alternatives: (*i*) no corporate and personal taxes; (*ii*) 50 per cent corporate taxes and zero personal taxes; (*iii*) 50 per cent corporate taxes and 30 per cent personal taxes; and (*iv*) 50 per cent corporate taxes, 20 per cent personal taxes on dividend income and 40 per cent personal taxes on interest income.

10. A company has set its target debt-equity ratio at 1:1 and target payout ratio at 40 per cent. The company wants to achieve a growth rate of 20 per cent per annum. The company is expecting before tax return on assets of 21 per cent. Its sales-to-assets ratio is 1.8 times. The current interest rate is 12 per cent. The corporate tax rate for the company is 35 per cent. Can the company sustain its intended growth? What should it do to achieve the growth rate?

11. *Hindustan Lever Limited (HLL):* From the following financial data for years from 1992 to 2002 (year ending 31 December) for HLL in Table 5.11, critically review the company's financing practice.

12. *Philips India Limited*: Table 5.12 gives data for Philips India Limited for the years from 1990 to 2002. The Company changed its accounting period from March to December in 1993, thus, data for the year 1993 are for 9 months. Comment on the company's investment and financing policy.

Table 5.11: Hindustan Lever Limited

(Rs in crore)

Year	*GFA*	*NCA*	*INVST*	*NW*	*Debt*	*NS*	*PBIT*	*INT*	*PAT*
1992	330.5	323.1	12.3	333.3	200.3	1221.1	197.0	32.2	60.0
1993	365.6	285.8	51.0	385.7	115.2	1505.0	244.9	27.2	79.8
1994	491.8	299.7	191.5	538.3	146.5	1721.3	327.4	29.5	97.3
1995	563.8	193.0	122.8	638.3	160.2	2039.4	385.2	20.2	122.1
1996	953.6	168.9	328.8	937.5	260.1	2798.8	654.2	57.0	185.2
1997	1035.2	567.2	544.6	1260.8	186.6	3337.8	874.2	33.9	232.0
1998	1273.4	895.3	729.5	1712.4	264.3	6560.7	1130.5	29.3	404.7
1999	1349.7	1151.8	1068.1	2102.6	177.3	7736.8	1420.1	22.4	570.3
2000	1539.4	1087.1	1832.2	2487.6	111.6	9426.1	1668.4	13.2	808.2
2001	1778.3	1349.7	1668.9	3043.0	83.7	10116.5	1865.6	7.7	1079.8
2002	1836.9	1639.0	2397.7	3658.2	58.3	10588.2	2154.4	9.2	1300.3

NOTES

Table 5.12: Philips India Limited

(Rs in crore)

Year	*GFA*	*NCA*	*INVST*	*NW*	*TD*	*STBB*	*LTB*	*DEBN*	*NS*	*PAT*
1990	154.7	82.1	2.1	41.3	116.5	12.1	104.4	56.7	391.2	–8.2
1991	162.1	97.1	7.6	63.6	101.8	16.0	85.8	48.3	523.1	26.7
1992	181.8	122.9	12.2	76.5	114.6	31.1	83.6	41.2	689.5	21.5
1993	232.1	112.8	13.8	129.3	69.3	6.4	52.9	22.8	672.0	9.0
1994	253.1	141.3	13.2	175.9	62.5	12.8	39.6	3.2	1092.7	33.7
1995	319.2	223.4	14.7	187.4	169.7	91.3	63.4	3.0	1454.4	22.1
1996	376.1	194.3	19.6	190.9	186.9	71.5	100.3	32.7	1438.8	11.8
1997	386.0	175.8	16.7	171.7	168.3	47.6	80.7	32.7	1509.4	44.6
1998	414.8	217.8	15.5	176.2	195.7	44.8	110.9	72.2	1620.1	39.2
1999	330.4	213.1	14.0	191.6	159.9	35.4	104.5	50.0	1662.9	41.4
2000	363.3	134.1	14.0	167.8	127.3	25.8	86.5	53.8	1444.4	–3.1
2001	334.7	40.0	17.3	147.3	66.1	45.9	20.2	0.0	1459.5	40.4
2002	605.4	67.6	1.9	306.4	48.0	5.5	42.5	8.3	1492.8	85.5

GFA = gross fixed assets; NCA = net current assets; INVST = investment; NW = net worth; TD = total debt borrowings; STBB = short-term bank borrowings; LTB = long-term borrowings including debentures; DEBN = debentures; NS = net sales; PAT = profit after tax.

UNIT 6 THE COST OF CAPITAL

NOTES

Structure

6.0 INTRODUCTION

Use of the DCF techniques for evaluating an investment project requires two basic inputs: (1) the estimates of the project's cash flows and (2) the discount rate. In our discussions of the investment decisions so far we have assumed that the discount rate is known. In this unit, we focus on the concept of the cost of capital as a discount rate and the procedure of its measurement.

The opportunity cost of capital (or simply, the cost of capital) for a project is the **discount rate** for discounting its cash flows. The **project's cost of capital** is the minimum required rate of return on funds committed to the project, which depends on the riskiness of its cash flows. Since the investment projects undertaken by a firm may differ in risk, each one of them will have its own unique cost of capital. It should be clear at the outset that the cost of capital for a project is defined by its risk, rather than the characteristics of the firm undertaking the project.

NOTES

The firm represents the aggregate of investment projects undertaken by it. Therefore, **the firm's cost of capital** will be the overall, or average, required rate of return on the aggregate of investment projects. Thus the firm's cost of capital is not the same thing as the project's cost of capital. Can we use the firm's cost of capital for discounting the cash flows of an investment project? The firm's cost of capital can be used for discounting the cash flows of those investment projects, which have risk equivalent to the average risk of the firm. As a first step, however, the firm's cost of capital can be used as a standard for establishing the required rates of return of the individual investment projects. In the absence of a reliable formal procedure of calculating the cost of capital for projects, the firm's cost of capital can be adjusted upward or downward to account for risk differentials of investment projects. That is, an investment project's required rate of return may be equal to the firm's cost of capital plus or minus a risk adjustment factor depending on whether the project's risk is higher or lower than the firm's risk. There does exit a methodology to calculate the cost of capital for projects. The objective method of calculating the risk-adjusted cost of capital for projects is to use the capital asset pricing model (CAPM), as we show later in this unit.

6.1 UNIT OBJECTIVES

- Explain the general concept of opportunity cost of capital
- Distinguish between the project cost of capital and the firm's cost of capital
- Learn about the methods of calculating component cost of capital and the weighted average cost of capital
- Recognise the need for calculating cost of capital for divisions
- Understand the methodology of determining the divisional beta and divisional cost of capital
- Illustrate the cost of capital calculation for a real company

6.2 SIGNIFICANCE OF THE COST OF CAPITAL

We should recognise that the cost of capital is one of the most difficult and disputed topics in the finance theory. Financial experts express conflicting opinions as to the correct way in which the cost of capital can be measured. Irrespective of the measurement problems, it is a concept of vital importance in the financial decision-making. It is useful as a standard for:

- evaluating investment decisions,
- designing a firm's debt policy, and
- appraising the financial performance of top management.

6.2.1 Investment Evaluation

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

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

6.2.2 Designing Debt Policy

The debt policy of a firm is significantly influenced by the cost consideration. As we shall learn later on, debt helps to save taxes, as interest on debt is a tax-deductible expense. The interest tax shield reduces the overall cost of capital, though it also increases the financial risk of the firm. In designing the financing policy, that is, the proportion of debt and equity in the capital structure, the firm aims at maximising the firm value by minimising the overall cost of capital.

NOTES

The cost of capital can also be useful in deciding about the methods of financing at a point of time. For example, cost may be compared in choosing between leasing and borrowing. Of course, equally important considerations are control and risk.[1]

6.2.3 Performance Appraisal

The cost of capital framework can be used to evaluate the financial performance of top management.[2] Such an evaluation will involve a comparison of actual profitability of the investment projects undertaken by the firm with the projected overall cost of capital, and the appraisal of the actual costs incurred by management in raising the required funds.

The cost of capital also plays a useful role in dividend decision and investment in current assets.

6.3 THE CONCEPT OF THE OPPORTUNITY COST OF CAPITAL

Decision-making is a process of choosing among alternatives. In the investment decisions, an individual or a manager encounters innumerable competing investment opportunities to choose from. For example, you may invest your savings of Rs 1,000 either in 7 per cent 3 year postal certificates or in 6.5 per cent 3 year fixed deposit in a nationalised bank. In both the cases, the government assures the payment; so the investment opportunities reflect equivalent risk. You decide to deposit your savings in the bank. By this action, you have foregone the opportunity of investing in the postal certificates. You have, thus, incurred an opportunity cost equal to the return on the foregone investment opportunity. It is 7 per cent in case of your investment. The opportunity cost is the rate of return foregone on the next best alternative investment opportunity of *comparable risk*. Thus, the required rate of return on an investment project is an opportunity cost.

6.3.1 Shareholders' Opportunities and Values

In the case of companies, there is a divorce between management and ownership. In an all-equity financed company, management makes investment decisions, but shareholders supply the capital. Therefore, a question may be raised: whose opportunity cost (or the required rate of return) should be considered in evaluating the investment projects? Since the firm's objective is to maximise the shareholders' wealth, the investment projects should be analysed in terms of their values to shareholders. To appreciate this point, suppose you are the owner-manager of a firm. You make the investment decisions and you supply funds to finance the investment projects. You will use your required rate of return to evaluate the investment projects. Your required rate of return will depend on investment opportunities of equivalent risk available to you in the financial markets. Thus the required rate of return (or the opportunity cost of capital) is market-determined rate.

Suppose you appoint a manager to manage your business. She has the responsibility for the investment decisions. Whose opportunity cost should the manager use? Since you are the supplier of funds and you own the firm and the manager is acting on your behalf, you will require her to use your required rate of return in making investment decisions. If she is unable to earn returns equal to your required rate of return, you can ask her to return the money to you, which you can invest in securities in the financial markets and earn the required rate of return.

Check Your Progress

1. What is the significance of the cost of capital?

1. Quirin, D.G., The Capital Expenditure Decision, Richard D. Irwin, 1967, p. 92.
2. Bhattacharya, S.K., A Cost-of-Capital Framework for Management Control, *Economic and Political Weekly*, Vol. 35, 29 August, 1970.

NOTES

Assume that you convert your firm into a joint-stock company where you invite other shareholders to contribute the capital and share ownership with them. Now many shareholders own the firm. The manager should consider *all* owners' (shareholders') required rate of return in evaluating the investment decisions. If the manager is unable to earn the rates on the investment projects, which the shareholders could themselves earn on alternative investment opportunities, they will be within their rights to ask for returning their funds. Thus, management acts as an agent of shareholders. It should evaluate investment opportunities using the shareholders' opportunity cost; that is, the rate the shareholders would use if they were themselves appraising the investment opportunities. Hence, *in an all-equity financed firm, the equity capital of ordinary shareholders is the only source to finance investment projects, the firm's cost of capital is equal to the opportunity cost of equity capital, which will depend only on the business risk of the firm.*

6.3.2 Creditors' Claims and Opportunities

In practice, both shareholders and creditors (debt-holders) supply funds to finance a firm's investment projects. Investors hold different claims on the firm's assets and cash flows, and thus, they are exposed to different degrees of risk. Creditors have a priority claim over the firm's assets and cash flows. The firm is under a legal obligation to pay interest and repay principal. Debt holders are, however, exposed to the risk of default. Since the firm's cash flows are uncertain, there is a probability that it may default on its obligation to pay interest and principal. Preference shareholders hold claim prior to ordinary shareholders but after debt holders. Preference dividend is fixed and known, and the firm will pay it *after* paying interest but before paying any ordinary dividend. Because preference dividend is subordinated to interest, preference capital is more risky than debt. Ordinary shareholders supply capital either in the form of retained earnings or by purchasing new shares. Unlike creditors, they are owners of the firm and retain its control. They delegate powers to management to make investment decisions on their behalf in such a way that their wealth is maximised. However, ordinary shareholders have claim on the residual assets and cash flows. The payment of ordinary dividend is discretionary. Ordinary shareholders may be paid dividends from cash remaining after interest and preference dividends have been paid. Also, the market price of ordinary share fluctuates more widely than that of the preference share and debt. Thus, ordinary share is more risky than both preference share and debt. Various forms of corporate debt can also be distinguished in terms of their differential riskiness. If we compare corporate bonds and government bonds, the later are less risky since it is very unlikely that the government will default in its obligation to pay interest and principal.

6.3.3 Risk Differences in Shareholders' and Creditors' Claims

Investors will require different rates of return on various securities since they have risk differences. Higher the risk of a security, the higher the rate of return demanded by investors. Since ordinary share is most risky, investors will require highest rate of return on their investment in ordinary shares. Preference share is more risky than debt; therefore, its required rate of return will be higher than that of debt. The risk-return relationship for various securities is shown in Figure 6.1. It may be observed in the figure that the required rate of return of any security is composed of two rates—a risk-free rate and a risk-premium. A risk-free will require compensation for time value and its risk-premium will be zero. Government securities, such as the treasury bills and bonds, are examples of the risk-free securities. Investors expect higher rates of return on risky securities. The higher the risk of a security, the higher will be its risk-premium, and therefore, a higher required rate of return.

Since the firm sells various securities to investors to raise capital for financing investment projects, it is, therefore, necessary that investment projects to be undertaken by the firm should generate *at least* sufficient net cash flow to pay investors—shareholders and debt holders—their required rates of return. In fact, investment projects should yield more cash flows than to just satisfy the investors' expectations in order to make a net contribution to the wealth of ordinary shareholders. *Viewed from all investors' point of view, the firm's cost of capital is the rate of return required by them for supplying capital for financing the firm's investment projects by purchasing various securities*. It may be emphasised that the rate of return required by all investors will be an *overall rate of return — a weighted rate of return*. Thus, the firm's cost of capital is the 'average' of the

NOTES

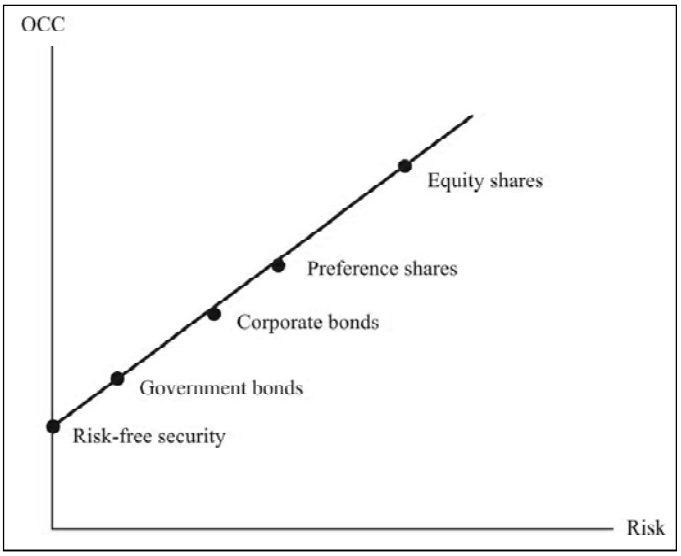


Figure 6.1: Risk-return relationships of various securities

opportunity costs (or required rates of return) of various securities, which have claims on the firm's assets. This rate reflects both the business (operating) risk and the financial risk resulting from debt capital. Recall that the cost of capital of an all-equity financed firm is simply equal to the ordinary shareholders' required rate of return, which reflects only the business risk.

6.3.4 General Formula for the Opportunity Cost of Capital

How does a firm know about the required rates of return of investors? The required rates of return are *market-determined*. They are established in the capital markets by the actions of competing investors. The influence of market is direct in the case of new issue of ordinary and preference shares and debt. The market price of securities is a function of the return expected by investors. The demand and supply forces work in such a way that equilibrium rates are established for various securities. Thus, the opportunity cost of capital is given by the following formula:

$$I_0 = \frac{C_1}{(1+k)} + \frac{C_2}{(1+k)^2} + \cdots + \frac{C_n}{(1+k)^n} \quad (1)$$

where I_0 is the capital supplied by investors in period 0 (it represents a net cash inflow to the firm), C_t are returns expected by investors (they represent cash outflows to the firm) and k is the required rate of return or the cost of capital.

In terms of Equation (1), the cost of capital is the internal rate of return, which equates the present values of inflows and outflows of a financial opportunity.[3] The outflows in Equation (1) represent the returns that investors could earn on the alternative investment opportunities of equivalent risk in the financial markets.

In the case of retained earnings, firms are not required to pay any dividends; no cash outflow takes place. Therefore, retained earnings have no explicit cost of capital. But they have a definite opportunity cost. The opportunity cost of retained earnings is the rate of return, which the ordinary shareholders would have earned on these funds if they had been distributed as dividends to them. The firm must earn a rate of return on retained funds which is at least equal to the rate that shareholders could earn on these funds to justify their retention.

6.3.5 Weighted Average Cost of Capital vs. Specific Costs of Capital

A firm obtains capital from various sources. As explained earlier, because of the risk differences and the contractual agreements between the firm and investors, the cost of capital of each source

3. Porterfield I.T.S., *Investment Decisions and Capital Costs*, Prentice-Hall, 1965, p. 45.

NOTES

of capital differs. The cost of capital of each source of capital is known as **component**, or **specific**, **cost of capital**. The combined cost of *all* sources of capital is called *overall*, or *average, cost of capital*. The component costs are combined according to the weight of each component capital to obtain the average costs of capital. Thus, the overall cost is also called the **weighted average cost of capital** (WACC).

Suppose a firm has the cost of equity of 11 per cent and cost of debt of 6 per cent. In the beginning of the year, the firm considers Project *A*, which has an expected rate of return of 10 per cent. The firm decides to finance this project by debt. If the component cost of capital is used to evaluate Project *A*, the firm will accept it since its IRR (10 per cent) is greater than the component cost (6 per cent.). After some time, the company considers Project *B*, which has same risk as Project *A* and also has an expected rate of return of 10 per cent. The firm finds that Project *A* has exhausted borrowings capacity, and hence, it will have to raise equity funds to finance Project *B*. Using the component cost of capital as the cut-off rate, the firm will reject Project *B* since its expected rate of return (10 per cent) is less than the component cost (11 per cent). Thus, out of two projects that are economically identical, the firm accepts one and rejects another simply because it associates the method of financing with the investment projects. What is wrong with this policy? It fails to consider the relationships between component costs. The various sources of capital are related to each other. The firm's decision to use debt in a given period reduces its future debt capacity as well as increases risk of shareholders. The shareholders will require a higher rate of return to compensate for the increased risk. Similarly, the firm's decision to use equity capital would enlarge its potential for borrowings in the future. Over the long run, the firm is expected to maintain a balance between debt and equity. The mix of debt and equity is called the firm's **capital structure**. Because of the connection between the sources of capital and the firm's desire to have a **target capital structure** in the long run, it is generally agreed that the cost of capital should be used in the composite, overall sense.[4] That is, in terms of the weighted average cost of capital.

The overall cost of capital is the weighted average cost of various sources of capital. For example, if the long-run proportions of debt and equity in the above mentioned example respectively are 60 per cent and 40 per cent, then the combined cost of capital is: $0.06 \times 0.60 + 0.11 \times 0.40 = 0.8$ or 8 per cent. Thus, both Projects *A* and *B* should be accepted since each of them is expected to yield a rate of return higher than the overall cost of capital. Accepting both Projects *A* and *B* will maximise the shareholders' wealth.

In practice, firms do not use the same debt-equity mix to finance their capital expenditures every year. They raise funds in "lumps". They may issue bonds at one time and at another time, they may either issue ordinary shares or may use retained earnings. The target capital structure is a policy decision. Firms may not hold the target capital structure in a particular year. But they maintain it in the long run. Therefore, in spite of "lumpy" financing by firms at different points in time, the overall cost of capital, rather than the component cost of capital, should be used in evaluating investment projects. It is not correct to associate a particular source of financing with a particular investment project.

Like the firm's WACC, we can also calculate the **project's WACC**. The debt capacity of the project may be different from the firm's overall debt capacity. Therefore, the capital structure of the project should be considered in calculating its WACC. In practice, financial managers for convenience may use the firm's capital structure to estimate the project's WACC.

You must remember that the relevant cost in the investment decisions is the **future cost** or the **marginal cost**. Marginal cost is the new or the incremental cost that the firm incurs if it were to raise capital now, or in the near future. The **historical cost** that was incurred in the past in raising capital is not relevant in financial decision-making. Historical costs may be significant to the extent that they help in predicting the future costs and in providing an evaluation of the past performance when compared with standard, or predetermined, costs.

Check Your Progress

2. Discuss the concept of the opportunity cost of capital.

4. Barges, A., The Effect of Capital Structure and the Cost of Capital, Prentice-Hall, 1963, p. 2.

6.4 COMPONENT COSTS OF CAPITAL AND SECURITY VALUATION

NOTES

A firm uses debt and equity to finance its assets. Generally, the component cost of a specific source of capital is equal to the investors' required rate of return, and it can be determined by using Equation (1). Equation (1) is a general form of valuation of a security. Thus, the concept of cost of capital is related to the valuation of equity and debt (bonds, debentures etc.). In this section, we shall briefly discuss the valuation of bonds, preference shares and equity (ordinary shares). Investors' required rate of return should be adjusted for taxes since net cash flows of an investment are calculated on after-tax basis.

6.4.1 Valuation of Bonds

Value of a bond depends on its cash flows and the discount rate. The expected cash flows consist of annual interest payments plus repayment of principal. The appropriate capitalisation, or discount, rate would depend upon the risk of the bond. The risk in holding a government bond is less than the risk associated with a debenture issued by a company. Consequently, a lower discount rate would be applied to the cash flows of the government bond and a higher rate to the cash flows of the company debenture.

Bonds maybe classified into three categories: (a) bonds with maturity, (b) pure discount bonds and (c) perpetual bonds.

Bonds with Maturity The government and companies mostly issue bonds that specify the interest rate (called coupon) and the maturity period. The present value of a bond (debenture) is the discounted value of its cash flows; that is, the annual interest payments plus bond's terminal, or maturity, value. The discount rate is the interest rate that investors could earn on bonds with similar characteristics. Let us consider Illustration 6.1.

Illustration 6.1: Value of a Bond with Maturity

Suppose an investor is considering the purchase of a five-year, Rs 1,000 par value bond, bearing a nominal rate of interest of 7 per cent per annum. The investor's required rate of return is 8 per cent. What should he be willing to pay now to purchase the bond if it matures at par?

The investor will receive cash Rs 70 as interest each year for 5 years and Rs 1,000 on maturity (i.e. at the end of the fifth year). We can thus determine the present value of the bond (B_0) as follows:

$$B_0 = \frac{70}{(1.08)^1} + \frac{70}{(1.08)^2} + \frac{70}{(1.08)^3} + \frac{70}{(1.08)^4} + \frac{70}{(1.08)^5} + \frac{1000}{(1.08)^5}$$

It may be observed that Rs 70 is an annuity for 5 years and Rs 1,000 is received as a lump sum at the end of the fifth year. Using the present value tables, given at the end of this book, the present value of bond is:

$$B_0 = 70 \times 3.993 + 1{,}000 \times 0.681 = 279.51 + 681 = \text{Rs } 960.51$$

This implies that Rs 1,000 bond is worth Rs 960.51 today if the required rate of return is 8 per cent. The investor would not be willing to pay more than Rs 960.51 for bond today. Note that Rs 960.51 is a composite of the present value of interest payments, Rs 279.51 and the present value of the maturity value, Rs 681.

Since some bonds will involve payment of an annuity (equal interest payments each year) and principal at maturity, we can use the following formula to determine the value of a bond:

Bond value = Present value of interest + Present value of maturity value

$$B_0 = \left[\frac{\text{INT}_1}{(1+k_d)} + \frac{\text{INT}_2}{(1+k_d)^2} + \cdots + \frac{\text{INT}_n}{(1+k_d)^n}\right] + \frac{B_n}{(1+k_d)^n}$$

$$B_0 = \sum_{t=1}^{n} \frac{\text{INT}_t}{(1+k_d)^t} + \frac{B_n}{(1+k_d)^n} \qquad (2)$$

NOTES

Notice that B_0 is the present value of a bond (debenture), INT_t is the amount of interest in period t (from year 1 to n), k_d is the market interest rate or the bond's required rate of return, B_n is bond's terminal or maturity value in period n and n is the number of years to maturity.

In Equation (2), the right-hand side consists of an annuity of interest payments that are constant (i.e., $INT_1 = INT_2 \ldots = INT_t$) over the bond's life and a final payment on maturity. Thus, we can use the annuity formula to value interest payments as shown below:

$$B_0 = \text{INT} \times \left[\frac{1}{k_d} - \frac{1}{k_d (1+k_d)^n} \right] + \frac{B_n}{(1+k_d)^n} \quad (3)$$

Pure Discount Bonds Pure discount bond, also called deep-discount bonds or zero-interest bonds or zero-coupon bonds do not carry an explicit rate of interest. It provides for the payment of a lump sum amount at a future date in exchange for the current price of the bond. The difference between the face value of the bond and its purchase price gives the return, which is also referred to as yield-to-maturity (YTM) to the investor. For example, a company may issue a pure discount bond of Rs 1,000 face value for Rs 520 today for a period of five years. Thus the debenture has (*a*) purchase price of Rs 520, (*b*) maturity value (equal to the face value) of Rs 1,000 and (*c*) maturity period of five years. The rate of interest can be calculated as follows:

$$520 = \frac{1,000}{(1+\text{YTM})^5}$$

$$(1+\text{YTM})^5 = \frac{1,000}{520} = 1.9231$$

$$i = 1.9231^{1/5} - 1 = 0.14 \text{ or } 14\%$$

You can also use the trial and error method to obtain YTM, which is 14 per cent.

It is quite simple to find the value of a pure discount bond as it involves one single payment (face value) at maturity. The **market interest rate**, also called the **market yield**, is used as the discount rate. The present value of this amount is the bond value.

Value of a pure discount bond = PV of the amount on maturity

$$B_0 = \frac{M_n}{(1+k_d)^n} \quad (4)$$

Perpetual Bonds Perpetual bonds, also called *consols*, have an indefinite life and therefore, they have no maturity value. Perpetual bonds or debentures are rarely found in practice. After the Napoleonic War, England issued these types of bonds to pay off many smaller issues that had been floated in prior years to pay for the war. In case of the perpetual bonds, as there is no maturity, or terminal value, the value of the bonds would simply be the discounted value of the infinite stream of interest flows.

Suppose that a 10 per cent Rs 1,000 bond will pay Rs 100 annual interest into perpetuity? What would be its value of the bond if the market yield or interest rate were 15 per cent? The value of the bond is determined as follows:

$$B_0 = \frac{\text{INT}}{k_d} = \frac{100}{0.15} = \text{Rs } 667$$

If the market yield is 10 per cent, the value of the bond will be Rs 1,000 and if it is 20 per cent the value will be Rs 500. Thus the value of the bond will decrease as the interest rate increases and vice-versa. Table 3.1 gives the value of a perpetual bond paying annual interest of Rs 100 at different discount (market interest) rates.

6.4.2 Valuation of Preference Shares

Like bonds, it is relatively easy to estimate cash flows associated with preference shares. The cash flows may include annual preference dividend and redemption value on maturity in case of

redeemable preference shares. The value of the preference share would be the sum of the present values of dividends and the redemption value.

Illustration 6.2: Value of a Preference Share

NOTES

Suppose an investor is considering the purchase of a 12-year, 10% Rs 100 par value preference share. The redemption value of the preference share on maturity is Rs 120. The investor's required rate of return is 10.5 per cent. What should she be willing to pay for the share now? The investor would expect to receive Rs 10 as preference dividend each year for 12 years and Rs 110 on maturity (i.e. at the end of 12 years). We can use the present value annuity factor to value the constant stream of preference dividends and the present value factor to value the redemption payment.

$$P_0 = 10 \times \left[\frac{1}{0.105} - \frac{1}{0.105 \times (1.105)^{12}} \right] + \frac{120}{(1.105)^{12}}$$

$$= 10 \times 6.506 + 120 \times 0.302 = 65.06 + 36.24 = \text{Rs}\,101.30$$

Note that the present value of Rs 101.30 is a composite of the present value of dividends, Rs 65.06 and the present value of the redemption value, Rs 36.24. The Rs 100 preference share is worth Rs 101.3 today at 10.5 per cent required rate of return. The investor would be better off by purchasing the share for Rs 100 today.

A formula similar to the valuation of bond can be used to value preference shares with a maturity period:

Value of preference share = Present value of dividends + Present value of maturity value

$$P_0 = \left[\frac{\text{PDIV}_1}{(1+k_p)^1} + \frac{\text{PDIV}_2}{(1+k_p)^2} + \cdots + \frac{\text{PDIV}_n}{(1+k_p)^n} \right] + \frac{\text{P}_n}{(1+k_p)^n}$$

$$P_0 = \sum_{t=1}^{n} \frac{\text{PDIV}_1}{(1+k_p)^t} + \frac{P_n}{(1+k_p)^n} \tag{5}$$

PDIV_t is the preference dividend per share in period t, k_p the required rate of return of preference share and P_n the value of the preference share on maturity. Since PDIV is an annuity, Equation (5) can also be written as follows:

$$P_0 = \text{PDIV} \times \left[\frac{1}{k_p} - \frac{1}{k_p (1+k_p)^n} \right] + \frac{P_n}{(1+k_p)^n} \tag{6}$$

Note that the term within parentheses on the right-hand side of the equation is the present value factor for an annuity of Re 1.

Irredeemable Preference Share How can we value an irredeemable preference share? Consider that a company has issued Rs 100 irredeemable preference share on which it pays a dividend of Rs 9. Assume that this type of preference share is currently yielding a dividend of 11 per cent. What is the value of the preference share? The preference dividend of Rs 9 is perpetuity. Therefore, the present value of the preference share is:

$$P_0 = \frac{\text{PDIV}}{k_p} = \frac{9}{0.11} = \text{Rs}\,81.82$$

6.4.3 Valuation of Equity (Ordinary Shares)

The general principle of valuation applies to the equity valuation. The value of a share today depends on cash inflows expected by investors and risk associated with those cash inflows. Cash inflows expected from an equity share consist of dividends that the owner expects to receive while holding the share and the price, which he expects to obtain when the share is sold. The price, which the owner is expected to receive when he sells the share, will include the original investment plus a capital gain (or minus a capital loss). The value of a share is the present value of its future stream of dividends. How can a share be valued?

NOTES

Single Period Valuation Let us assume that an investor intends to buy a share and will hold it for one year. Suppose he expects the share to pay a dividend of Rs 2 next year, and would sell the share at an expected price of Rs 21 at the end of the year. If the investor's opportunity cost of capital or the required rate of return (k_e) is 15 per cent, how much should he pay for the share today? The present value of the share today, P_0, will be determined as the present value of the expected dividend per share at the end of the first year, DIV_1, plus the present value of the expected price of the share after a year, P_1.

$$P_0 = \frac{\text{DIV}_1 + P_1}{1 + k_e} \tag{7}$$

$$P_0 = \frac{2 + 21}{1.15} = \text{Rs } 20$$

Equation (7) gives the *'fair'* or *'reasonable' price* of the share since it reflects the present value of the share. The investor would buy the share if the actual price were less than Rs 20. In a *well-functioning capital market*, there ought not to be any difference between the present value and market value of the share. Investors would have full information and it would be reflected in the market price of the share in a well-functioning market. In practice, there could be a difference between the present value and the market value of a share. An **under-valued share** has a market price less than the share's present value. On the other hand, an **over-valued share** has a market price higher than the share's present value.

It may be seen in the example that the share value after a year represents an expected growth or capital gain of 5 per cent:

$$g = \frac{21 - 20}{20} = 0.05 \quad \text{or} \quad 5 \text{ per cent}$$

$$\text{g} = \frac{P_1 - P_0}{P_0} \tag{8}$$

An investor can, thus, represent his expectation with regard to the future share price in terms of expected growth. If the share price is expected to grow at g per cent, then we can write P_1 as follows:

$$P_1 = P_0(1 + g)$$

We can rewrite Equation (7) as:

$$P_0 = \frac{\text{DIV}_1 + P_0(1 + g)}{1 + k_e} \tag{9}$$

Simplifying Equation (9), we obtain a simple formula for the share valuation as follows:

$$P_0 = \frac{\text{DIV}_1}{k_e - g} \tag{10}$$

In words, the present value of a share is determined by its expected dividend discounted (divided) by the difference of the shareholders capitalisation, or required, rate of return (k_e) and growth rate (g). In the example, if the investor would have expected the share price to grow at 5 per cent, the value of the share today using Equation (10) will be:

$$P_0 = \frac{2}{0.15 - 0.05} = \frac{2}{0.10} = \text{Rs } 20$$

Multi-period valuation In the preceding section, we discussed a single-period share valuation model, where the investor was expected to hold share for one year and then sell it at the end of the year. The investor will receive dividend for one year, DIV_1, and the share value, P_1, when he sells the share at the end of the year. The value of the share today is given by Equation (7).

Why does the new investor purchase the share at the end of one year? Because he also expects a stream of dividends during the period he holds the share plus the liquidating price of the share.

NOTES

What determines the next year's price (P_1) if the share is held for one year? The price next year (P_1) will depend on expected dividend in year 2 and expected price of the share at the end of year 2. For example, if we consider that DIV_2 = Rs 2.10 and P_2 = Rs 22.05, then P_1 is:

$$P_1 = \frac{2.10 + 22.05}{1.15} = \text{Rs } 21$$

Today's price (P_0) can be calculated as the discounted value of dividends in years 1 and 2 and liquidating price at the end of year 2 as follows:

$$P_0 = \frac{2}{1.15} + \frac{2.10 + 22.05}{(1.15)^2} = \text{Rs } 20$$

Thus, if Equation (7) holds, P_1 should be given by the following formula:

$$P_1 = \frac{\text{DIV}_2 + P_2}{1 + k_e} \tag{11}$$

We can express P_0 as follows:

$$P_0 = \frac{1}{1 + k_e}(\text{DIV}_1 + P_1)$$

By substituting the value of P_1 from Equation (13), we obtain the share price today as given below:

$$P_0 = \frac{1}{1 + k_e}\left[\text{DIV}_1 + \frac{\text{DIV}_2 + P_2}{1 + k_e}\right]$$

$$P_0 = \frac{\text{DIV}_1}{1 + k_e} + \frac{\text{DIV}_2 + P_2}{(1 + k_e)^2} \tag{12}$$

We can further extend the time horizon. If the final period is *n*, we can write the general formula for share value as follows:

$$P_0 = \frac{\text{DIV}_1}{(1 + k_e)} + \frac{\text{DIV}_2}{(1 + k_e)^2} + \cdots + \frac{\text{DIV}_n + P_n}{(1 + k_e)^n} \tag{13}$$

$$P_0 = \sum_{t=1}^{n} \frac{\text{DIV}_t}{(1 + k_e)^t} + \frac{P_n}{(1 + k_e)^n} \tag{14}$$

In principle, the time horizon *n* could be very large; in fact, it can be assumed to approach infinity (∞). *If the time horizon, n, approaches to infinity, then the present value of the future price will approach to zero*. Thus the price of a share today is the present value of an infinite stream of dividends.

$$P_0 = \frac{\text{DIV}_1}{(1 + k_e)} + \frac{\text{DIV}_2}{(1 + k_e)^2} + \cdots + \frac{\text{DIV}_{n=\infty}}{(1 + k_e)^{n=\infty}} \tag{15}$$

$$P_0 = \sum_{t=1}^{n=\infty} \frac{\text{DIV}_t}{(1 + k_e)^t} \tag{16}$$

Dividends, DIV_t, in Equation (14 or 15) represent stream of *expected dividends*. If a totally equity financed firm retains a constant proportion of its annual earnings (say, *b*) and reinvests it at its internal rate of return, which is its return on equity (say, ROE), then dividends will grow at a constant rate equal to the product of retention ratio and return on equity; that is, $g = b \times \text{ROE}$. Growth will be more if the firm retains higher portion of earnings. The current dividend will, however, be reduced. A share valuation model should explicitly involve growth expectations. Let us assume that dividends grow at a constant rate to infinity. If the firm now pays dividend DIV_0 (that is dividend in year, 0), then dividend at the end of first year will be:

NOTES

$$DIV_1 = DIV_0(1+g)^1$$

and at the end of the second year, it will be:

$$DIV_2 = DIV_1(1+g) = DIV_0(1+g)^2$$

and so on. Thus, when dividends grow constantly the formula for share valuation can be written as follows:

$$P_0 = \frac{DIV_0(1+g)}{(1+k_e)} + \frac{DIV_0(1+g)^2}{(1+k_e)^2} + \cdots + \frac{DIV_0(1+g)^{n=\infty}}{(1+k_e)^{n=\infty}} \quad (17)$$

$$P_0 = \sum_{t=1}^{n=\infty} \frac{DIV_0(1+g)^t}{(1+k_e)^t} \quad (18)$$

After solving Equation (18), we obtain

$$P_0 = \frac{DIV_0(1+g)}{k_e - g}$$

$$P_0 = \frac{DIV_1}{k_e - g} \quad (19)$$

In words, the present value of a share is equal to the dividend after a year, DIV_1, divided by the difference of the capitalisation rate (k_e) and the growth rate (g); that is, ($k_e - g$). Equation (19) is the **constant-growth model** or **perpetual-growth model**. It is based on the following assumptions:

- The capitalisation rate or the opportunity cost of capital must be greater than the growth rate, ($k_e > g$), otherwise absurd results will be attained. If $k_e = g$, the equation will yield an infinite price, and if $k_e < g$, the result will be a negative price.
- The initial dividend per share, DIV_1, must be greater than zero (i.e., $DIV_1 > 0$), otherwise Equation (19) will obtain a zero price.

The relationship between k_e and g is assumed to remain constant and perpetual.

6.5 DETERMINING COMPONENT COSTS OF CAPITAL

Generally, the component cost of a specific source of capital is equal to the investors' required rate of return, and it can be determined by using Equation (1). But the investors' required rate of return should be adjusted for taxes in practice for calculating the cost of a specific source of capital to the firm.[5] In the investment analysis, net cash flows are computed on an after-tax basis, therefore, the component costs, used to determine the discount rate, should also be expressed on an after-tax basis.

6.6 COST OF DEBT

A company may raise debt in a variety of ways. It may borrow funds from financial institutions or public either in the form of public deposits or debentures (bonds) for a specified period of time at a certain rate of interest. A debenture or bond may be issued at par or at a discount or premium as compared to its face value. The contractual rate of interest or the coupon rate forms the basis for calculating the cost of debt.

5. It is argued later that flotation costs should not be incorporated in the computation of the cost of capital, rather they should be adjusted in the investment project's cash flows.

NOTES

6.6.1 Debt Issued at Par

The before-tax cost of debt is the rate of return required by lenders. It is easy to compute before-tax cost of debt issued and to be redeemed at par; it is simply equal to the *contractual* (or *coupon rate*) *of interest*. For example, a company decides to sell a new issue of 7 year 15 per cent bonds of Rs 100 each at par. If the company realises the full face value of Rs 100 bond and will pay Rs 100 principal to bondholders at maturity, the before-tax cost of debt will simply be equal to the rate of interest of 15 per cent. Thus:

$$k_d = i = \frac{\text{INT}}{B_0} \tag{20}$$

where k_d is the before-tax cost of debt, i is the coupon rate of interest, B_0 is the issue price of the bond (debt) and in Equation (18) it is assumed to be equal to the face value (F), and INT is the amount of interest. The amount of interest payable to the lender is always equal to:

$$\text{Interest} = \text{Face value of debt} \times \text{Interest rate}$$

The before-tax cost of bond in the example is:

$$k_d = \frac{\text{Rs}\,15}{\text{Rs}100} = 0.15 \text{ or } 15\%$$

We could arrive at same results as above by using Equation (1): cash outflow are Rs 15 interest per year for 7 years and Rs 100 at the end of seventh year in exchange for Rs 100 now. Thus:

$$100 = \frac{15}{(1+k_d)} + \frac{15}{(1+k_d)^2} + \frac{15}{(1+k_d)^3} + \frac{15}{(1+k_d)^4} + \frac{15}{(1+k_d)^5} + \frac{15}{(1+k_d)^6} + \frac{15}{(1+k_d)^7} + \frac{100}{(1+k_d)^7}$$

$$100 = \sum_{t=1}^{n} \frac{15}{(1+k_d)^t} + \frac{100}{(1+k_d)^7}$$

$$100 = 15(\text{PVFA}_{7,\ k_d}) + 100(\text{PVF}_{7,\ k_d})$$

By trial and error, we find that the discount rate (k_d), which solves the equation, is 15 per cent:

$$100 = 15(4.160) + 100(0.376) = 62.40 + 37.60 = 100$$

Clearly, the before-tax cost of bond is the rate, which the investment should yield to meet the outflows to bondholders.

6.6.2 Debt Issued at Discount or Premium

Equations (1) and (20) will give identical results only when debt is issued at par and redeemed at par. Equation (1) can be rewritten as follows to compute the before-tax cost debt:

$$B_0 = \sum_{t=1}^{n} \frac{\text{INT}_t}{(1+k_d)^t} + \frac{B_n}{(1+k_d)^n} \tag{21}$$

where B_n is the repayment of debt on maturity and other variables as defined earlier.[6] Equation (21) can be used to find out the cost of debt whether debt is issued at par or discount or premium, i.e., $B_0 = F$ or $B_0 > F$ or $B_0 < F$. Let us consider an example.

6. Financial institutions generally require principal to be amortised periodically. The issue of bond or debenture by a company may also provide for periodical amortisation. When principal is repaid each period instead of a lump sum at maturity, cash outflows each period will include interest and principal, and interest each period will be calculated on the outstanding principal. The following formula can be used to calculate the before-tax cost of debt in this situation:

$$B_0 = \sum_{t=1}^{n} \frac{\text{INT}_t + B_t}{(1+k_d)^t} \tag{1A}$$

where INT_t and B_t are respectively the periodical payment of interest and principal.

NOTES

Illustration 6.3: Cost of a Bond Sold at Discount

Assume that in the preceding example of 7-year 15 per cent bonds, each bond is sold below par for Rs 94. Using Equation (21), k_d is calculated as:

$$94 = \sum_{t=1}^{7} \frac{15}{(1+k_d)^t} + \frac{100}{(1+k_d)^7}$$

$$94 = 15(\text{PVFA}_{7,k_d}) + 100(\text{PVF}_{7,k_d})$$

By trial and error, k_d = 16.5 per cent. Let us try 17%:

$$15(3.922) + 100(0.333)$$

$$58.83 + 33.30 = 91.13 < 94$$

Since PV at 17% is less than the required PV (Rs 94), let us try 16%*:*

$$= 15(4.038) + 100(0.354) = 60.57 + 35.40 = 95.97 > 94$$

The discount rate k_d should lie between 16 – 17%. By interpolation, we find:

PV required	94.00	
		1.97
PV at 16%	95.97	
		3.84
PV at 17%	92.13	

$$k_d = 16\% + (17\% - 16\%)\frac{1.97}{3.84} = 16.5\%$$

$k_d = 16.5$ per cent, Equation (3) is satisfied

$$94 = 15(3.980) + 100(0.343) = 59.70 + 34.30 = 94$$

If the discount or premium is adjusted for computing taxes, the following short-cut method can also be used to calculate the before-tax cost of debt:

$$k_d = \frac{\text{INT} + \frac{1}{n}(F - B_0)}{\frac{1}{2}(F + B_0)} \tag{22}$$

Thus using data of Illustration 6.3, we obtain

$$k_d = \frac{15 + \frac{1}{7}(100 - 94)}{\frac{1}{2}(100 + 94)} = \frac{15.86}{97} = 0.164 \quad \text{or} \quad 16.4\%$$

Note that the short-cut method gives approximately the same result as Equation (21). The principal drawback of the method is that it does not consider the sinking fund payments or the annual compounding.[7]

It should be clear from the preceding discussion that the before-tax cost of bond to the firm is affected by the issue price. The lower the issue price, the higher will be the before-tax cost of debt. The highly successful companies may sell bond or debenture at a premium ($B_0 > F$); this will pull down the before-tax cost of debt.

6.6.3 Tax Adjustment

The interest paid on debt is tax deductible. The higher the interest charges, the lower will be the amount of tax payable by the firm. This implies that the government indirectly pays a part of the lender's required rate of return. As a result of the **interest tax shield**, the after-tax cost of debt to the firm will be substantially less than the investors' required rate of return. The before-tax cost of debt, k_d, should, therefore, be adjusted for the tax effect as follows:

$$\text{After-tax cost of debt} = k_d(1 - T) \tag{23}$$

7. Quirin, *op. cit.*

where T is the corporate tax rate. If the before-tax cost of bond in our example is 16.5 per cent, and the corporate tax rate is 35 per cent,[8] the after-tax cost of bond will be:

$$k_d(1-T) = 0.1650\ (1-0.35) = 0.1073 \text{ or } 10.73\%$$

It should be noted that the tax benefit of interest deductibility would be available only when the firm is profitable and is paying taxes. An unprofitable firm is not required to pay any taxes. It would not gain any tax benefit associated with the payment of interest, and its true cost of debt is the before-tax cost.

NOTES

It is important to remember that in the calculation of the average cost of capital, the after-tax cost of debt must be used, not the before-tax cost of debt.

Illustration 6.4: Cost of a Bond Sold at Discount and Redeemable at Premimum

A 7-year Rs 100 debenture of a firm can be sold for a net price of Rs 97.75. The rate of interest is 15 per cent per year, and bond will be redeemed at 5 per cent premium on maturity. The firm's tax rate is 35 per cent. Compute the after-tax cost of debenture.

The annual interest will be: $F \times i$ = Rs 100 × 0.15 = Rs 15, and maturity price will be: Rs 100 (1.05) = Rs 105. We can use Equation (21) to compute the after-tax cost of debenture:

$$97.75 = \sum_{t=1}^{n} \frac{15}{(1+k_d)} + \frac{105}{(1+k_d)^7}$$

By trial and error, we find:

$$k_d = 16\%: 15(4.038) + 105(0.354) = 97.75$$

The after-tax cost of debenture will be:

$$k_d(1-T) = 0.16(1-0.35) = 0.104 \text{ or } 10.4\%$$

6.6.4 Cost of the Existing Debt

Sometime a firm may like to compute the "current" cost of its existing debt. In such a case, the cost of debt should be approximated by the current market yield of the debt. Suppose that a firm has 11 per cent debentures of Rs 100,000 (Rs 100 face value) outstanding at 31 December 19X1 to be matured on December 31, 19X6. If a new issue of debentures could be sold at a net realisable price of Rs 80 in the beginning of 19X2, the cost of the existing debt, using short-cut method (Equation 22), will be

$$k_d = \frac{11+1/5(100-80)}{1/2(100+80)} = \frac{15}{90} = 0.167 \quad \text{or} \quad 16.7\%$$

If T = 0.35, the after-cost of debt will be:

$$k_d(1-T) = 0.167(1-0.35) = 0.109 \quad \text{or} \quad 10.9\%$$

6.7 COST OF PREFERENCE CAPITAL

The measurement of the cost of preference capital poses some conceptual difficulty. In the case of debt, there is a binding legal obligation on the firm to pay interest, and the interest constitutes the basis to calculate the cost of debt. However, in the case of preference capital, payment of dividends is not legally binding on the firm and even if the dividends are paid, it is not a *charge* on earnings; rather it is a distribution or *appropriation* of earnings to preference shareholders. One may, therefore, be tempted to conclude that the dividends on preference capital do not constitute cost. This is not true.

Check Your Progress

3. While calculating cost of debt, what is known as the interest tax shield?

The cost of preference capital is a function of the dividend *expected* by investors. Preference capital is never issued with an intention not to pay dividends. Although it is not legally binding upon the firm to pay dividends on preference capital, yet it is generally paid when the firm makes sufficient profits. The failure to pay dividends, although does not cause bankruptcy, yet it can be a serious matter from the ordinary shareholders' point of view. The non-payment of dividends on preference

8. Currently the corporate tax rate in India is 35 per cent.

NOTES

capital may result in voting rights and control to the preference shareholders. More than this, the firm's credit standing may be damaged. The accumulation of preference dividend arrears may adversely affect the prospects of ordinary shareholders for receiving any dividends, because dividends on preference capital represent a prior claim on profits. As a consequence, the firm may find difficulty in raising funds by issuing preference or equity shares. Also, the market value of the equity shares can be adversely affected if dividends are not paid to the preference shareholders and, therefore, to the equity shareholders. For these reasons, dividends on preference capital should be paid regularly except when the firm does not make profits, or it is in a very tight cash position.

6.7.1 Irredeemable Preference Share

The preference share may be treated as a perpetual security if it is irredeemable.[9] Thus, its cost is given by the following equation:

$$k_p = \frac{\text{PDIV}}{P_0} \tag{24}$$

where k_p is the cost of preference share, PDIV is the expected preference dividend, and P_0 is the issue price of preference share.

Illustration 6.5: Cost of Irredeemable Preference Share

A company issues 10 per cent irredeemable preference shares. The face value per share is Rs 100, but the issue price is Rs 95. What is the cost of a preference share? What is the cost if the issue price is Rs 105?

We can compute cost of a preference share as follows:

Issue price Rs 95: $k_p = \frac{\text{PDIV}}{P_0} = \frac{10}{95} = 0.1053 \text{ or } 10.53\%$

Issue price Rs 105: $k_p = \frac{\text{PDIV}}{P_0} = \frac{10}{105} = 0.0952 \text{ or } 9.52\%$

6.7.2 Redeemable Preference Share

Redeemable preference shares (that is, preference shares with finite maturity) are also issued in practice. A formula similar to Equation (21) can be used to compute the cost of redeemable preference share:

$$P_0 = \sum_{t=1}^{n} \frac{\text{PDIV}_t}{(1+k_p)^t} + \frac{P_n}{(1+k_p)^n} \tag{25}$$

In Equation (25), k_p is the cost of preference capital. Given the current price, expected preference dividend (PDIV_t), and maturity price k_f can be found by trial and error.

The cost of preference share is not adjusted for taxes because preference dividend is paid after the corporate taxes have been paid. Preference dividends do not save any taxes.[10] Thus, the cost of preference share is automatically computed on an after-tax basis. Since interest is tax deductible and preference dividend is not, the after-tax cost of preference is substantially higher than the after-tax cost of debt.

6.8 COST OF EQUITY CAPITAL

Firms may raise equity capital internally by retaining earnings. Alternatively, they could distribute the entire earnings to equity shareholders and raise equity capital externally by issuing new

9. In India, irredeemable preference shares can not be issued.
10. In fact, companies in India now will have to pay tax at 12.5 per cent on the amount of dividend distributed. Thus, the effective cost of preference capital to a company would be more than that shown by Equation (24) or (25). The same argument will be applicable to the equity capital.

shares. In both cases, shareholders are providing funds to the firms to finance their capital expenditures. Therefore, the equity shareholders' required rate of return would be the same whether they supply funds by purchasing new shares or by foregoing dividends, which could have been distributed to them. There is, however, a difference between retained earnings and issue of equity shares from the firm's point of view. The firm may have to issue new shares at a price lower than the current market price. Also, it may have to incur flotation costs. Thus, **external equity** will cost more to the firm than the **internal equity**.

NOTES

6.8.1 Is Equity Capital Free of Cost?

It is sometimes argued that the equity capital is free of cost. The reason for such argument is that it is not legally binding for firms to pay dividends to ordinary shareholders. Further, unlike the interest rate or preference dividend rate, the equity dividend rate is not fixed. It is fallacious to assume equity capital to be free of cost. As we have discussed earlier, equity capital involves an *opportunity cost*; ordinary shareholders supply funds to the firm in the expectation of dividends and capital gains commensurate with their risk of investment. The market value of the shares determined by the demand and supply forces in a well functioning capital market reflects the return required by ordinary shareholders. Thus, the shareholders' required rate of return, which equates the present value of the expected dividends with the market value of the share, is the cost of equity. The cost of external equity would, however, be more than the shareholders' required rate of return if the issue price were different from the market price of the share.

In practice, it is a formidable task to measure the cost of equity. The difficulty derives from two factors: First, it is very difficult to estimate the expected dividends. Second, the future earnings and dividends are expected to grow over time. Growth in dividends should be estimated and incorporated in the computation of the cost of equity. The estimation of growth is not an easy task. Keeping these difficulties in mind, the methods of computing the cost of internal and external equity are discussed below.

6.8.2 Cost of Internal Equity: The Dividend-growth Model

A firm's internal equity consists of its retained earnings. The opportunity cost of the retained earnings is the rate of return foregone by equity shareholders. The shareholders generally expect dividend and capital gain from their investment. The required rate of return of shareholders can be determined from the dividend valuation model.[11]

Normal growth As explained in Unit 8, the dividend-valuation model for a firm whose dividends are expected to grow at a constant rate of g is as follows:

$$P_0 = \frac{\text{DIV}_1}{k_e - g} \tag{26}$$

where $\text{DIV}_1 = \text{DIV}_0 (1 + g)$.

Equation (26) can be solved for calculating the cost of equity k_e as follows:

$$k_e = \frac{\text{DIV}_1}{P_0} + g \tag{27}$$

The cost of equity is, thus, equal to the expected dividend yield (DIV_1/P_0) plus capital gain rate as reflected by expected growth in dividends (g). It may be noted that Equation (27) is based on the following assumptions:[12]

- The market price of the ordinary share, P_0, is a function of expected dividends.
- The dividend, DIV_1, is positive (i.e., $\text{DIV}_1 > 0$).
- The dividends grow at a constant growth rate g, and the growth rate is equal to the return on equity, ROE, times the retention ratio, b (i.e., $g = \text{ROE} \times b$).
- The dividend payout ratio [i.e., $(1 - b)$] is constant.

Check Your Progress

4. What is the main difference in calculating the cost of preference capital and the cost of debt when in both the cases the rate of return is generally fixed?

11. The cost of equity can also be determined by using the capital asset pricing model. This is discussed in a later section.
12. Gordon, M., *The Investment, Financing and Valuation of the Corporation*, Richard D. Irwin, 1962.

NOTES

The cost of retained earnings determined by the dividend-valuation model implies that if the firm would have distributed earnings to shareholders, they could have invested it in the shares of the firm or in the shares of other firms of similar risk at the market price (P_0) to earn a rate of return equal to k_e. Thus, the firm should earn a return on retained funds equal to k_e to ensure growth of dividends and share price. If a return less than k_e is earned on retained earnings, the market price of the firm's share will fall. It may be emphasised again that the cost of retained earnings will be equal to the shareholders' required rate of return since no flotation costs are involved.

Illustration 6.6: Constant-Growth Model and the Cost of Equity

Suppose that the current market price of a company's share is Rs 90 and the expected dividend per share next year is Rs 4.50. If the dividends are expected to grow at a constant rate of 8 per cent, the shareholders' required rate of return is:

$$k_e = \frac{\text{DIV}_1}{P_0} + g$$

$$k_e = \frac{\text{Rs } 4.50}{\text{Rs } 90} + 0.08 = 0.05 + 0.08 = 0.13 \text{ or } 13\%$$

If the company intends to retain earnings, it should at least earn a return of 13 per cent on retained earnings to keep the current market price unchanged.

Supernormal growth A firm may pass through different phases of growth. Hence, dividends may grow at different rates in the future. The growth rate may be very high for a few years, and afterwards, it may become normal indefinitely in the future. The dividend-valuation model can also be used to calculate the cost of equity under different growth assumptions. For example, if the dividends are expected to grow at a super-normal growth rate, g_s, for n years and thereafter, at a normal, perpetual growth rate of, g_n, beginning in year $n + 1$, then the cost of equity can be determined by the following formula:

$$P_0 = \sum_{t=1}^{n} \frac{\text{DIV}_0 (1 + g_s)^t}{(1 + k_e)^t} + \frac{P_n}{(1 + k_e)^n} \tag{28}$$

P_n is the discounted value of the dividend stream, beginning in year $n + 1$ and growing at a constant, perpetual rate g_n, at the end of year n, and therefore it is equal to:

$$P_n = \frac{\text{DIV}_{n+1}}{k_e - g_n} \tag{29}$$

When we multiply P_n by $1/(1 + k_e)^n$ we obtain the present value of P_n in year 0. Substituting Equation (29) in Equation (28), we get

$$P_0 = \sum_{t=1}^{n} \frac{\text{DIV}_0 (1 + g_s)^t}{(1 + k_e)^t} + \frac{\text{DIV}_{n+1}}{k_e - g_n} \times \frac{1}{(1 + k_e)^n} \tag{30}$$

The cost of equity, k_e, can be computed by solving Equation (30) by trial and error.

Illustration 6.7: Cost of Equity: Two-Stage Growth

Assume that a company's share is currently selling for Rs 134. Current dividends, DIV_0 are Rs 3.50 per share and are expected to grow at 15 per cent over the next 6 years and then at a rate of 8 per cent forever. The company's cost of equity can be found out as follows:

$$\begin{aligned}
134 &= \sum_{t=1}^{6} \frac{3.50(1.15)_t}{(1+k_e)^t} + \frac{\text{DIV}_7}{(k_e - 0.08)} \times \frac{1}{(1+k_e)^6} \\
&= \frac{4.03}{(1+k_e)} + \frac{4.63}{(1+k_e)^2} + \frac{5.33}{(1+k_e)^3} \\
&\quad + \frac{6.13}{(1+k_e)^4} + \frac{7.05}{(1+k_e)^5} + \frac{8.11}{(1+k_e)^6} + \frac{8.11(1.08)}{(k_e - 0.08)} \times \frac{1}{(1+k_e)^6} \\
&= 4.03(\text{PV A}_{1,k_e}) + 4.63(\text{PV A}_{2,k_e}) + 5.33(\text{PV A}_{3,k_e}) \\
&\quad + 6.13(\text{PV A}_{4,k_e}) + 7.05(\text{PV A}_{5,k_e}) + 8.11(\text{PV A}_{6,k_e}) + \frac{8.76}{k_e - 0.08}(\text{PV A}_{6,k_e})
\end{aligned}$$

By trial and error, we find that k_e = 0.12 or 12 per cent:

$$134 = 4.03(0.893) + 4.63(00.797) + 5.33(0.712) + 6.13(0.636) + 7.05(0.567) + 8.11(0.507) + \frac{8.76}{0.12 - 0.08}(0.507)$$

NOTES

Zero-growth In addition to its use in constant and variable growth situations, the dividend valuation model can also be used to estimate the cost of equity of no-growth companies. The cost of equity of a share on which a constant amount of dividend is expected perpetually is given as follows:

$$k_e = \frac{\text{DIV}_1}{P_0} \tag{31}$$

The growth rate *g* will be zero if the firm does not retain any of its earnings; that is, the firm follows a policy of 100 per cent payout. Under such case, dividends will be equal to earnings, and therefore Equation (31) can also be written as:

$$k_e = \frac{\text{DIV}_1}{P_0} = \frac{\text{EPS}_1}{P_0} \quad (\text{since } g = 0) \tag{32}$$

which implies that in a no-growth situation, the expected earnings–price (E/P) ratio may be used as the measure of the firm's cost of equity.

6.8.3 Cost of External Equity: The Dividend Growth Model

The firm's external equity consists of funds raised externally through public or rights issues. The minimum rate of return, which the equity shareholders require on funds supplied by them by purchasing new shares to prevent a decline in the existing market price of the equity share, is the cost of external equity. The firm can induce the existing or potential shareholders to purchase new shares when it promises to earn a rate of return equal to:

$$k_e = \frac{\text{DIV}_1}{P_0} + g$$

Thus, the shareholders' required rate of return from retained earnings and external equity is the same. The cost of external equity is, however, greater than the cost of internal equity for one reason. The selling price of the new shares may be less than the market price. In India, the new issues of ordinary shares are generally sold at a price less than the market price prevailing at the time of the announcement of the share issue. Thus, the formula for the cost of new issue of equity capital may be written as follows:

$$k_e = \frac{\text{DIV}_1}{P_I} + g \tag{33}$$

where P_I is the issue price of new equity. The cost of retained earnings will be less than the cost of new issue of equity if $P_0 > P_I$.

Illustration 6.8: Cost of Internal and External Equity

The share of a company is currently selling for Rs 100. It wants to finance its capital expenditures of Rs 100 million either by retaining earnings or selling new shares. If the company sells new shares, the issue price will be Rs 95. The dividend per share next year, DIV_1, is Rs 4.75 and it is expected to grow at 6 per cent. Calculate (*i*) the cost of internal equity (retained earnings) and (*ii*) the cost of external equity (new issue of shares).

Equation (29) can be used to calculate the cost of internal equity:

$$k_e = \frac{\text{Rs } 4.75}{\text{Rs } 100} + 0.06 = 0.0475 + 0.06 = 0.1075 \text{ or } 10.75\%$$

The cost of external equity can be calculated as follow:

$$k_e = \frac{\text{Rs } 4.75}{\text{Rs } 95} + 0.06 = 0.05 + 0.06 = 0.11 \text{ or } 11\%$$

It is obvious that the cost of external equity is greater than the cost of internal equity because of the under-pricing (cost of external equity = 11% > cost of internal equity = 10.75%).

NOTES

6.8.4 Earnings–Price Ratio and the Cost of Equity

As a general rule, it is not theoretically correct to use the ratio of earnings to price as a measure of the cost of equity. The earnings – price (E/P) ratio does not reflect the true expectations of the ordinary shareholders. For example, if the current market price of a share is Rs 500 (face value being Rs 100) and the earning per share is Rs 10, the E/P ratio will be: Rs 10 ÷ Rs 500 = 0.02 or 2 per cent. Does this mean that the expectation of shareholders is 2 per cent? They would, in fact, expect to receive a stream of dividends and a final price of the share that would result in a return significantly greater than the E/P ratio. Thus, the dividend valuation model gives the most of valid measure of the cost of equity.

There are exceptions, however. One exception that we have already pointed out is the no-growth firms. The cost of equity in the case of the no-growth firms is equal to the expected E/P ratio:

$$k_e = \frac{\text{DIV}_1}{P_0} + g = \frac{\text{EPS}_1(1-b)}{P_0} + br \qquad (\because g = br)$$

$$= \frac{\text{EPS}_1}{P_0} \qquad (\because b = 0)$$

where b is the earnings retention rate, EPS_1 is the expected earnings per share and r is the return investment (equity).

Another situation where the expected earnings-price ratio may be used as a measure of the cost of equity is *expansion*, rather than *growth* faced by the firm. A firm is said to be *expanding*, not growing, if the investment opportunities available to it are expected to earn a rate of return equal to the cost of equity.[13] For example, Equation (27) may be written as follows:

$$P_0 = \frac{\text{EPS}_1(1-b)}{(k_e - rb)} \qquad (34)$$

If $r = k_e$, then

$$P_0 = \frac{\text{EPS}_1(1-b)}{(k_e - k_e b)} = \frac{\text{EPS}_1(1-b)}{k_e(1-b)} = \frac{\text{EPS}_1}{k_e}$$

and solving for k_e, we get

$$k_e = \frac{\text{EPS}_1}{P_0}$$

Illustration 6.9: Earnings-Price Ratio and the Cost of Equity

A firm is currently earning Rs 100,000 and its share is selling at a market price of Rs 80. The firm has 10,000 shares outstanding and has no debt. The earnings of the firm are expected to remain stable, and it has a payout ratio of 100 per cent. What is the cost of equity? If the firm's payout ratio is assumed to be 60 per cent and that it earns 15 per cent rate of return on its investment opportunities, then, what would be the firm's cost of equity?

In the first case since expected growth rate is zero, we can use expected earnings-price ratio to compute the cost of equity. Thus:

$$k_e = \frac{\text{Rs } 10}{\text{Rs } 80} = 0.125 \text{ or } 12.5\%$$

The earnings per share are Rs 100,000 ÷ 10,000 = Rs 10. If the firm pays out 60 per cent of its earnings, the dividends per share will be: Rs 10 × 0.6 = Rs 6, and the retention ratio will be 40 per cent. If the expected return on interval investment opportunities is 15 per cent, then the firm's expected growth is: 0.40 × 0.15 = 0.06 or 6 per cent. The firm's cost of equity will be:

$$k_e = \frac{\text{Rs } 6}{\text{Rs } 80} + 0.06 = 0.075 + 0.06 = 0.135 \text{ or } 13.5\%$$

Check Your Progress

5. Is there any difference between the cost of internal equity and cost of external equity?

13. Solomon, E., *The Theory of Financial Management*, Columbia University Press, 1963, p. 64.

6.9 COST OF EQUITY AND THE CAPITAL ASSET PRICING MODEL

NOTES

The expected rate of return on equity or the cost of equity can be measured as the risk-free rate plus risk premium. This approach is based on the Capital Asset Pricing Model (CAPM). What is a risk-free rate of return? How is risk premium determined? Various types of securities may have different degrees of risk. One can think of a security, such as the government bond or the Treasury bill as a risk-free security. For such security, the risk of default is zero and, therefore, investors expect compensation for time only. In India, the risk-free rate can be assumed to be about 6 per cent as a number of government securities offer such returns to investors. Securities, such as corporate bonds and shares have risk of default, shares being riskier than bonds or debentures. Therefore, investors, in addition to risk-free rate of return as a compensation for the time value of money, also require a premium to compensate for risk. Higher the risk, higher the risk premium required. Thus, the required rate of return of equity is given by the following simple expression:

Required Equity Return = Risk-free Rate + Risk Premium.

The above equation implies that the return on risky securities, such as equity shares must exceed the risk-free rate which the investor can easily earn from a risk-free security. The underlying assumption here is that investors are risk averse, and thus, require higher compensation in terms of returns for taking higher risk. Since the securities differ in terms of their riskiness, their risk premiums also vary. How do we find the amount of risk premium?

Risk of a particular share can be measured in a number of ways. In conventional terms, the risk associated with a share may be defined as the variability that is likely to occur in the future returns from the investment. This can be measured by computing the variability in returns expected by the investor. Such an approach would require information about chances (probability) of occurrence of various possible returns to the investor. The problem with this approach is the practical difficulty of obtaining probability distributions of returns. More than the practical difficulties, a question of the concept of risk is also involved.

6.9.1 Systematic and Unsystematic Risk

We can distinguish between systematic and unsystematic risk. Securities, when combined into a portfolio, generally help the investor in reducing the overall risk through the process of diversification. The amount of risk which is diversified is called unsystematic risk and the risk which cannot be eliminated is called systematic risk. Unsystematic risks are unique to individual companies. Examples include strike in a firm; resignation of the marketing manager; winning a large contract; non-availability of raw material etc. In a portfolio of securities, individual firms' risks cancel out. Systematic risks are market-related, and affect all companies. Examples of systematic risk include change in interest rates; change in corporate tax rate; deficit financing; restrictive monetary policy etc. Investors are exposed to such risks even when they hold highly diversified portfolio of securities. When measuring the risk of security, we focus on systematic risk.

To measure systematic risk, one may look for the information on how the returns of a share have behaved in the past in relationship with factors which have affected the stock market. For this, one may, for example, examine the behaviour of the index of the company's share prices vis-à-vis the market index of share prices. The measure of the sensitivity of the returns of a share with the market returns is called beta (β). The beta of share *j* is written as β_j.

The CAPM provides an alternative approach for the calculation of the cost equity. As per the CAPM, the required rate of return on equity is given by the following relationship:

$$k_e = R_f + (R_m - R_f)\beta_j \quad (35)$$

Equation (35) requires the following three parameters to estimate a firm's cost of equity:

NOTES

- ***The risk-free rate*** (R_f) The yields on the government Treasury securities are used as the risk-free rate. You can use returns either on the short-term or the long-term Treasury securities. It is a common practice to use the return on the short-term Treasury bills as the risk-free rate. Since investments are long-term decisions, many analysts prefer to use yields on long-term government bonds as the risk-free rate. You should always use the current risk-free rate rather than the historical average.
- ***The market risk premium*** ($R_m - R_f$) The market risk premium is measured as the difference between the long-term, historical arithmetic averages of market return and the risk-free rate. Some people use a market risk premium based on returns of the most recent years. This is not a correct procedure since the possibility of measurement errors and variability in the short-term, recent data is high. As we explained in Unit 4, the variability (standard deviation) of the estimate of the market risk premium will reduce when you use long series of market returns and risk-free rates. We showed in Unit 4, that the historical market risk premium on shares in India was about 9 per cent when we use return on the 91-day Treasury bills as the risk-free rate. If you use the current yield on 91-day Treasury bills as the risk-free rate, then the market risk premium should also be based on the historical average return of 91-day Treasury bills. On the other hand, if you use the current yield on 30-year government bonds as the risk-free rate, then the market risk premium should also be based on the historical average yield of 30-year government bonds. You should be consistent; you should match the estimation of the market risk premium with the maturity of the security used as the risk-free rate.
- ***The beta of the firm's share*** (β) Beta (β) is the systematic risk of an ordinary share in relation to the market. In Unit 4, we have explained the regression methodology for calculating beta for an ordinary share. The share returns are regressed to the market returns to estimate beta. A broad-based index like the BSE's Sensitivity (Sensex) Index is used as a proxy for the market.

Suppose the risk-free rate is 6 per cent, the market risk premium is 9 per cent and beta of L&T's share is 1.54. The cost of equity for L&T is:

$$k_{L\&T} = 0.06 + 0.09 \times 1.54 = 0.1986 \approx 20\%$$

6.10 COST OF EQUITY: CAPM VS. DIVIDEND–GROWTH MODEL

The dividend-growth approach has limited application in practice because of its two assumptions. First, it assumes that the dividend per share will grow at a constant rate, g, forever. Second, the expected dividend growth rate, g, should be less than the cost of equity, k_e, to arrive at the simple growth formula. That is:

$$k_e = \frac{\text{DIV}_1}{P_0} + g$$

These assumptions imply that the dividend-growth approach cannot be applied to those companies, which are not paying any dividends, or whose dividend per share is growing at a rate higher than k_e, or whose dividend policies are highly volatile. The dividend–growth approach also fails to deal with risk directly. In contrast, the CAPM has a wider application although it is based on restrictive assumptions. The only condition for its use is that the company's share is quoted on the stock exchange. Also, all variables in the CAPM are market determined and except the company specific share price data, they are common to all companies. The value of beta is determined in an objective manner by using sound statistical methods. One practical problem with the use of beta, however, is that it does not probably remain stable over time.

Check Your Progress

6. What is beta of a firm's share?

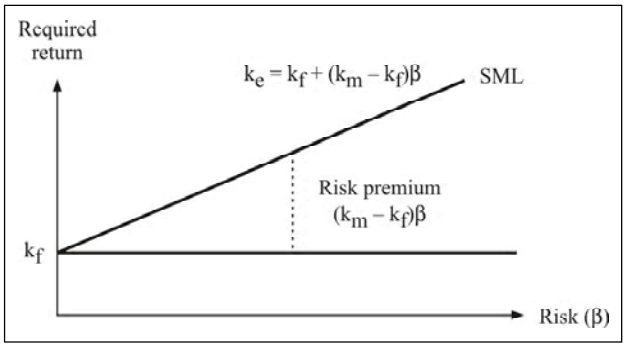


Figure 6.2: Cost of equity under CAPM

6.11 THE WEIGHTED AVERAGE COST OF CAPITAL

Once the component costs have been calculated, they are multiplied by the proportions of the respective sources of capital to obtain the weighted average cost of capital (WACC). The proportions of capital must be based on target capital structure. WACC is the composite, or overall cost of capital. You may note that it is the weighted average concept, not the simple average, which is relevant in calculating the overall cost of capital. The simple average cost of capital is not appropriate to use because firms hardly use various sources of funds equally in the capital structure.

The following steps are involved for calculating the firm's WACC:

- Calculate the cost of specific sources of funds
- Multiply the cost of each source by its proportion in the capital structure.
- Add the weighted component costs to get the WACC.

In financial decision-making, the cost of capital should be calculated on an after-tax basis. Therefore, the component costs should be the after-tax costs. If we assume that a firm has only debt and equity in its capital structure, then the WACC (k_0) will be:

$$k_0 = k_d (1-T) w_d + k_e w_e$$

$$k_0 = k_d (1-T) \frac{D}{D+E} + k_e \frac{E}{D+E} \quad (36)$$

where k_0 is the WACC, $k_d (1 - T)$ and k_e are, respectively, the after-tax cost of debt and equity, D is the amount of debt and E is the amount of equity. In a general form, the formula for calculating WACC can be written as follows:

$$k_0 = k_1 w_1 + k_2 w_2 + k_3 w_3 + \cdots \quad (37)$$

where $k_1, k_2, \ldots$ are component costs and $w_1, w_2, \ldots$ weights of various types of capital employed by the company.

Weighted marginal cost of capital (WMCC) Marginal cost is the new or the incremental cost of new capital (equity and debt) issued by the firm. We assume that new funds are raised at new costs according to the firm's target capital structure. Hence, what is commonly known as the WACC is in fact the weighted marginal cost of capital (WMCC); that is, the *weighted average cost of new capital given the firm's target capital structure*.

6.11.1 Book Value Versus Market Value Weights

You should always use the **market value weights** to calculate WACC. In practice, firms do use the book value weights. Generally, there will be difference between the book value and market value weights, and therefore, WACC will be different. WACC, calculated using the book-value weights, will be understated if the market value of the share is higher than the book value and *vice versa*.

NOTES

Illustration 6.10: Weighted Average Cost of Capital

Lohia Chemicals Ltd has the following book value capital structure on 31 March, 2004:

Source of Finance	*Amount (Rs '000)*	*Proportion (%)*
Share capital	450,000	45
Reserves and surplus	150,000	15
Preference share capital	100,000	10
Debt	300,000	30
	1,000,000	100

The expected after-tax component costs of the various sources of finance for Lohia Chemicals Ltd are as follows:

Source	*Cost (%)*
Equity	18.0
Reserve and surplus	18.0
Preference share capital	11.0
Debt	8.0

The weighted average cost of capital of Lohia, based on the existing capital structure, is computed in Table 6.1.

Table 6.1: Computation of Weighted Average Cost of Capital

Source	*Amount (Rs '000) (1)*	*Proportion (%) (2)*	*After-tax Cost (%) (3)*	*Weighted Cost (%) (4) (5) = (3) × (4)*
Equity capital	450,000	45	18	8.1
Reserves & surplus	150,000	15	18	2.7
Preference capital	100,000	10	11	1.1
Debt	300,000	30	8	2.4
	1,000,000	100	WACC	14.3

Suppose Lohia Chemicals Ltd has 45,000,000 equity shares outstanding and that the current market price per share is Rs 20. Assume that the market values and the book values of debt and the preference share capital are the same. If the component costs were the same as before, the market value weighted average cost of capital would be about 15 per cent:

Table 6.2: Computation of Weighted Average Cost of Capital (Market-value Weights)

Source	*Amount (Rs '000) (1)*	*Proportion (%) (2)*	*After-tax Cost (%) (3)*	*Weighted Cost (%) (4) (5) = (3) × (4)*
Equity capital	900,000	69.2	18	12.5
Preference capital	100,000	7.7	11	0.8
Debt	300,000	23.1	8	1.8
	1,300,000	100	WACC	15.1

It should be noticed that the equity capital for Lohia Chemicals Ltd. is the total market value of the ordinary shares outstanding, which includes retained earnings (reserves). It is obvious that the market value weighted cost of capital (15.1%) is higher than the book value weighted cost of capital (14.3%), because the market value of equity share capital (Rs 900,000,000) is higher than its book value (Rs 600,000,000).

Why do managers prefer the book value weights for calculating WACC? Besides the simplicity of the use, managers claim following advantages for the book value weights:

- Firms in practice set their target capital structure in terms of book values.
- The book value information can be easily derived from the published sources.
- The book value debt-equity ratios are analysed by investors to evaluate the risk of the firms in practice.

NOTES

The use of the book-value weights can be seriously questioned on theoretical grounds. First, the component costs are opportunity rates and are determined in the capital markets. The weights should also be market-determined. Second, the book-value weights are based on arbitrary accounting policies that are used to calculate retained earnings and value of assets. Thus, they do not reflect economic values. It is very difficult to justify the use of the book-value weights in theory.

Market-value weights are theoretically superior to book-value weights. They reflect economic values and are not influenced by accounting policies. They are also consistent with the market-determined component costs. The difficulty in using market-value weights is that the market prices of securities fluctuate widely and frequently. A market value based target capital structure means that the amounts of debt and equity are continuously adjusted as the value of the firm changes.

6.12 FLOTATION COSTS, COST OF CAPITAL AND INVESTMENT ANALYSIS

A new issue of debt or shares will invariably involve **flotation costs** in the form of legal fees, administrative expenses, brokerage or underwriting commission. One approach is to adjust the flotation costs in the calculation of the cost of capital. Let us take an example to illustrate the point.

Suppose that a firm is considering an investment project, which involves a net cash outlay of Rs 450,000, and that it is expected to generate an annual net cash inflow of Rs 150,000 for 7 years. The project's target debt ratio is 50 per cent. The flotation costs of debt and share issues are estimated at 10 per cent of the amount raised. To finance the project, the firm will issue 7-year 15 per cent debentures of Rs 250,000 at par (Rs 100 face value), and new shares of Rs 250,000. The issue price of a share is Rs 20 and the expected dividend per share next year is Rs 1.80. Dividends are expected to grow at a compound rate of 7 per cent forever. Assume that corporate tax rate is 50 per cent. What is the NPV of the project?

The project's NPV can be calculated using WACC adjusted for flotation costs as the discount rate. Under this procedure, the before-tax cost of debt is given by the following equation:

$$B_0(1-f) = \sum_{t=1}^{n} \frac{\text{INT}_t + B_t}{(1+k_d)^t} \tag{38}$$

and the cost of equity as follows:

$$k_e = \frac{\text{DIV}_1}{P_0(1-f)} + g \tag{39}$$

where f is the fraction of flotation costs. Thus, the before-tax cost of debt in the example will be:

$$100(1-0.10) = \sum_{t=1}^{7} \frac{15}{(1+k_d)^t} + \frac{100}{(1+k_d)^7}$$

By trial and error, we find k_d = 17.6 per cent. If tax rate is 50 per cent, the after-tax cost of debt will be: 0.176 (1 – 0.50) = 0.088 or 8.8 per cent. The cost of equity will be as follows:

$$k_e = \frac{\text{Rs } 1.80}{\text{Rs } 20(1-0.1)} + 0.07 = 0.10 + 0.07 = 0.17 \text{ or } 17\%$$

The 'flotation-costs adjusted' weighted average cost of capital will be:

Check Your Progress

7. What is the weighted average cost of capital?

NOTES

$$k_o = 0.088 \times 0.50 + 0.17 \times 0.50 = 0.13 \text{ or } 13\%$$

The NPV of the investment project using the discount rate of 13 per cent is

$$\text{NPV} = -450{,}000 + \sum_{t=1}^{7} \frac{150{,}000}{(1.13)^t}$$
$$= -450{,}000 + 150{,}000 \times 4{,}423 = \text{Rs } 213{,}450$$

This is not a correct procedure. Flotation costs are *not* annual costs; they are *one-time costs* incurred when the investment project is undertaken and financed. If the cost of capital is adjusted for the flotation costs and used as the discount rate, the effect of the flotation costs will be compounded over the life of the project. Thus, the net present value of the investment project will be biased. The correct procedure is to adjust the investment project's cash flows for the flotation costs and use the weighted average cost of capital, unadjusted for the flotation costs, as the discount rate.[14] Since the flotation costs are incurred at the time the investment project is financed, they can be added to the project's initial cost. The flotation costs in the example are: 0.1 (2,50,000 + 2,50,000) = Rs 50,000. Thus, the net cash outlay of the project will be Rs 500,000. Since the component costs are *not* adjusted for flotation costs, the after-cost of debt will be: 0.15 (1 – 0.5) = 0.075 or 7.5 per cent and the cost of equity will be

$$k_e = \frac{\text{Rs } 1.80}{\text{Rs } 20} + 0.07 = 0.09 + 0.07 = 0.16 \quad \text{or} \quad 16 \text{ per cent}$$

WACC, without the adjustment of floatation costs, will be

$$k_o = 0.075 \times 0.5 + 0.16 \times 0.5 = 0.12 \text{ or } 12\%$$

The NPV of the investment project will be:

$$\text{NPV} = -500{,}000 + \sum_{t=1}^{7} \frac{150{,}000}{(1.12)^t} = -500{,}000 + 150{,}000 \times 4.564$$
$$= \text{Rs } 184{,}600$$

The project's NPV in the example is overstated when we adjust flotation costs in computing the discount rate.

In some situations, it may not be possible to exactly apportion flotation costs to given projects, particularly when the firm raises large amount of capital for unidentified future investments.

6.13 DIVISIONAL AND PROJECT COST OF CAPITAL

We emphasise again that the required rate of return, or the cost of capital is a market determined rate and it reflects compensation to investors for the time value of money and risk of the investment project. It is, thus, composed of a risk-free rate (compensation for time) *plus* a risk-premium rate (compensation for risk). Investors are generally risk-averse, and demand a premium for bearing risk. The greater the risk of an investment opportunity, the greater the risk-premium required by investors. Therefore, the required rate of return of a division or a project depends on its risk. Since investors are risk-averse, divisions and projects with differing risks should be evaluated using their risk-adjusted required rates of return.

The firm's risk is composed of its overall operating risk and financial risk. **Operating risk** arises due to the uncertainty of cash flows of the firm's investments. **Financial risk** arises on account of the use of debt for financing investments. The firm's risk is also a composite risk of assets financed

14. Keene, Simon E., The Investment Discount Rate—In Defence of the Market Rate of Interest, *Accounting and Business Research* (Summer 1976); and Ezzell, John R. and Porter, R. Pourr, Floatation costs and the Weighted Average Cost of Capital, *Journal of Financial and Quantitative Analysis*, 11, (Sept. 1976). Also, refer Van Horne, *op. cit.*

NOTES

by the firm. Thus, the firm's cost of capital reflects the rate of return required on its securities commensurate with the perceived 'average' risk. The firm's cost of capital, therefore, cannot be used for evaluating individual divisions or investment projects that have different degree of risk. The firm's cost of capital as a required rate of return for all projects may work well in case of companies that have single line of business or where different businesses are highly correlated. In highly diversified, multiple-business firms like L&T, or Grasim Industries Limited, all projects cannot have same risk. Even Hidustan Lever Limited (HLL), which basically operates in fast moving consumer products markets, has distinct markets for its consumer products. In each market segment, HLL is exposed to different degrees of competition and other environmental forces, which results in different risks for all its market segments. Hence, it is essential to estimate the required rate of return for each market segment or division than using the firm's cost of capital as a single, corporate-wide required rate of return for evaluating projects of divisions. Further, projects within a single division may differ in risk. For example, the risk of introducing a new, innovative product will be higher than the expansion of an existing product. Hence there is need for calculating the required rate of return for projects within a division.

The capital asset pricing model is helpful in determining the required rate of return (or the cost of capital) for a division or a project. The risk-free rate and the market premium for divisions or projects are same as for the firm. What we need is the divisional or project betas. In practice, it is difficult to estimate divisional or project betas. What approach could we follow to estimate the required rate of return of a division or a project?

6.13.1 The Pure-Play Technique

Suppose that Surya Enterprises Limited has three divisions: Pharmaceuticals Division, Financial Services Division and Power Generation Division. The company's cost of capital is 12 per cent. Since the company has three diverse businesses with different operating characteristics, it cannot use its overall cost of capital as the required rate of return for its divisions. It should estimate the required rate of return for each division separately. Suppose Surya is considering an investment in the Pharmaceuticals Division, and therefore, it would like to estimate the required rate of return for the division. A most commonly suggested method for calculating the required rate of return for a division (or project) is the **pure-play technique**. The basic idea is to use the beta of the comparable firms, called **pure-play firms**, in the same industry or line of business as a proxy for the beta of the division or the project. The application of the pure-play approach for calculating the Pharmaceuticals Division's cost of capital will involve the following steps:

Identify comparable firms The critical step is the identification of comparable or pure-play firms. These firms should have business identical to the division or the project. It is rare to find perfectly comparable or pure-play firms in practice, as any two firms in the same line of business cannot have exactly similar features; they would have some differences. However, it is not impossible to identify approximately equivalent matches in terms of product line and product mixes. One or two good matches would suffice as proxy for the division or the project. If good matches cannot be found, the average data of a broader sample of firms should be used to even out the differences.

Surya has identified the following three pure-play firms:

Firm	*Sales (Rs million)*	*Assets (Rs million)*	*Debt (Rs million)*	*Market value equity (Rs million)*
Excel Pharma	1,000	650	325	645
Sunshine Pharma	800	700	180	700
Kiran Pharma	1,400	1,250	625	750

Estimate equity betas for comparable firms Once the comparable or the pure-play firms have been identified, their betas should be calculated using CAPM framework and a market index such as Sensex. Alternatively, we can use betas computed by organizations like the Bombay Stock Exchange or the National Stock Exchange or any other agency. These betas are based on the

NOTES

share price and the market index data. Hence they are the **equity betas** for the pure-play firms. An equity beta (β_e) is also called levered beta ((β_l).

The equity betas for Excel, Sunshine and Kiran, estimated using the CAPM approach, are 1.24, 0.94 and 1.05.

Estimate asset betas for comparable firms The comparable firms also employ debt to finance their assets. The equity betas of these firms are affected by their debt ratios. The firm may have a different target capital structure that the debt ratios of the proxy firms. Therefore, the pure-play technique requires that the levered equity betas of the proxy firms should be changed to unlevered or all-equity beta. Unlevered or all-equity betas are also called asset betas. In Unit 6, we showed that unlevered (or asset) beta is the weighted average of beta for debt and equity (or levered) beta:

$$\beta_a = \beta_d\left(\frac{D}{V}\right) + \beta_e\left(\frac{E}{V}\right)$$

$$\beta_u = \beta_d\left(\frac{D}{V}\right) + \beta_l\left(\frac{E}{V}\right)$$

If we consider that debt is risk free, then β_d is zero, and we can find unlevered beta as follows:

$$\beta_u = \beta_l\left(\frac{E}{V}\right) = \beta_l\left(1 - \frac{D}{V}\right) \tag{40}$$

where β_u is the beta of the pure-play firm after removing the effect of leverage; β_l is its equity beta with leverage; and E/V is the ratio of the pure-play firm's equity to its total market value. Note Equation (40) is based on two important assumptions. First, that debt is risk free and hence the beta for debt is zero. Second, all pure-play firms maintain target capital structures and therefore, the amounts of debt change with the change in the values of firms.[15] The unlevered or all-equity beta is also called the asset beta as it incorporates only the firm's operating risk and is not influenced by the financial risk arising from the use of debt.

The unlevered or asset betas for Excel, Sunshine and Kiran are as follows:

Asset Beta for Excel

$$\beta_a = 1.24 \times \frac{645}{325 + 645} = 1.24 \times 0.665 = 0.82$$

Asset Beta for Sunshine

$$\beta_a = 0.94 \times \frac{700}{180 + 700} = 0.94 \times 0.795 = 0.75$$

Asset Beta for Kiran

$$\beta_a = 1.05 \times \frac{750}{625 + 750} = 1.05 \times 0.545 = 0.55$$

Calculate the division's beta We can use the average asset beta of the pure-play firms as a proxy for the asset beta of the Pharmaceutical Division of Surya Enterprises Limited. We can use either simple or the weighted average. We can use either sales or assets or the value of the firms as weights. The theory does not tell us whether we should use simple or weighted average and what should be the weights. In practice, financial analysts will have to use their judgment. We think that since there is no theory and since we do not know the nature of measurement error, a simple average will do a good job. For illustration, we calculate the weighted beta using assets as weights:

15. The implication is that the amount of debt, and hence the interest tax shield will fluctuate with the firm's operations. This means that the interest tax shield will be as risky as the operations. Thus, we do not make any adjustment for interest tax shield in unlevering (or levering beta). This point is explained in a subsequent unit.

Weighted asset beta

$$= 0.82 \times \frac{650}{2,600} + 0.75 \times \frac{700}{2,600} + 0.55 \times \frac{1,250}{2,600} = 0.67$$

Calculate the division's all-equity cost of capital Suppose that the risk-free rate is 6 per cent and market risk premium is 9 per cent. The Pharmaceutical Division's all-equity cost of capital is:

$$k_a = r_f + \text{risk} - \text{premium} \times \beta_a$$
$$k_a = 0.06 + 0.09 \times 0.67 = 0.12 \text{ or } 12\%$$

The all-equity cost of capital is without financial risk. As it reflects only the business risk, it is also referred to as the asset or unlevered cost of capital.

Calculate the division's equity cost of capital The asset (or unlevered) beta for the Pharmaceutical Division is 0.67. We need to convert the asset (unlevered) beta into the equity (levered) beta for calculating the cost of equity for the Pharmaceutical Division. To obtain the equity beta, the asset beta should be relevered to reflect the target capital structure of the Pharmaceutical Division. What is the target capital structure of the Pharmaceutical Division? Surya Enterprises Limited may use the firm's target capital structure for the Pharmaceutical Division as well. Alternatively, it may decide the Pharmaceutical Division's target capital structure based on the average debt ratio of the pure-play firms. The average debt ratio (D/V) of the pure-play firms is 0.33. Using this ratio, the equity beta for the Pharmaceutical Division is 1.00:

$$\beta_l = \beta_u \left(\frac{E}{V}\right) = \beta_u \left(1 - \frac{D}{V}\right)$$

$$\beta_u = \beta_l \left(\frac{1}{1 - \frac{D}{V}}\right) \tag{41}$$

$$= 0.67 \left(\frac{1}{1 - 0.33}\right) = 0.67 \times 1.49 = 1.00$$

Now we can calculate the cost of equity for the Pharmaceutical Division as follows:

$$k_e = 0.06 + 0.09 \times 1.00 = 0.15 \text{ or } 15\%$$

Calculate the division's cost of capital The cost of capital for the division is the weighted average of the cost of equity and the cost of debt. We have estimated the target debt ratio for the Pharmaceutical Division as 0.33. Suppose the cost of debt (before tax) for the Pharmaceutical Division is 10 per cent and tax rate is 35 per cent, its weighted cost of capital can be calculated as follows:

$$k_0 = k_d (1 - T)\left(\frac{D}{V}\right) + k_e \left(\frac{E}{V}\right) \tag{42}$$

$$= 0.10(1 - 0.35)(0.33) + 0.15(0.67) = 0.12 \text{ or } 12\%$$

It should be clear from the approach discussed here that each division has its own operating risk and debt capacity. Therefore, for calculating the cost of capital for each division, you should determine its operating risk and debt capacity. Assets of the firm are the aggregate of assets of the divisions. Therefore, the beta of assets for the firm should be the weighted average of betas for the divisions:

$$\text{Firm's asset beta} = \text{beta of division1} \times \text{weight of division1}$$
$$+ \text{beta of division2} \times \text{weight of division2} + \cdots$$
$$+ \text{beta of division} n \times \text{weight of division} n$$

It seems plausible that weights may be expressed in terms of market value of assets. In practice, the market value of assets of divisions are not available, therefore, weights may be expressed in terms of book value assets or sales.

NOTES

NOTES

The calculated average asset beta for the firm may be more than its observed asset beta. This may happen because of the synergy effect. A vertically integrated firm is likely to be more efficient than if the divisions operate as independent, separate firms. The vertically integrated firms are able to reduce operating cost. This premium resulting from diversification should be allocated to the divisions. Management will have to use its judgment in doing so as there is no formula available. Yet another problem that may arise in moving from a single cut-off rate to multiple cut-off rates, relates to the behaviour of managers. Some managers may resist the change. For some divisions (with higher risks), the divisional cut-off rates will be higher than the corporate-wide cut-off rate. These divisions are likely to get fewer funds allocated to them. They may therefore oppose the system of the multiple cut-off rates. Management must take all into confidence and convince them that the use of a single, corporate-wide cut-off rate use is biased in favour of the investment projects of high-risk divisions since their expected returns will be higher. In the long-term, this approach will make the firm highly risky. Ideally, the firm would like to balance risk by having a portfolio of high risk and low risk projects.

Illustration 6.11: Calculation of Beta and Cost of Capital for a Division

Sinhgarh Engineering Company wants to diversify into fertiliser business and organise it as a new division. The company found a comparable fertiliser company of roughly the same characteristics as the proposed division. It has equity beta of 1.35, and debt ratio of 0.72. The corporate tax rate is 35 per cent. Sinhgarh will have a debt ratio of 0.50 for proposed fertiliser business. The risk-free rate is 8 per cent and the risk premium is 10 per cent. Calculate the cost of equity for the proposed new division.

First, we shall 'unlever' the levered equity beta (that is, calculate the asset beta) of the comparable (pure-play) firm:

$$\beta_a = \beta_e\left(1-\frac{D}{V}\right) = 1.35(1-0.72) = 0.38$$

We can use the asset beta of the comparable firm as a proxy for the asset beta of the fertiliser division.

Second, we can now 'lever' the asset beta to obtain the equity beta for the division by incorporating its debt ratio:

$$\beta_e = \beta_a\left(\frac{1}{1-\frac{D}{V}}\right) = 0.38\left(\frac{1}{1-0.50}\right) = 0.38\times 2.00 = 0.76$$

The equity beta for the division is lower than that of the comparable firm since it will employ less debt.

Third, we can calculate the division's cost of equity as follows:

$$k_e = 0.08 + 0.10\times 0.76 = 0.156 \text{ or } 15.6\%$$

6.13.2 The Cost of Capital for Projects

The procedure described for calculating the cost of capital for divisions can be followed in the case of large projects. Many times it may be quite difficult to identify comparable (pure-play) firms. We explained in Unit 4 that the risk of a project depends on its operating leverage. So you can estimate a project's beta based on its operating leverage. You may also consider the variability of the project's earnings to estimate the beta.

A simple practical approach to incorporate risk differences in projects is to adjust the firm's or division's WACC (upwards or downwards), and use the adjusted WACC to evaluate the investment project:

$$\text{Adjusted WACC} = \text{WACC} \pm R \qquad (43)$$

That is, a project's cost of capital is equal to the firm's or division's weighted average cost of capital plus or minus a risk adjustment factor, R. The risk adjustment factor would be determined on the basis of the decision maker's past experience and judgment regarding the project's risk. It should be noted that adjusting or division's WACC for risk differences is not theoretically a very

sound method; however, this approach is better than simply using the firm's or division WACC for *all* projects without regard for their risk.

Companies in practice may develop policy guidelines for incorporating the project risk differences. One approach is to divide projects into broad risk classes, and use different discount rates based on the decision maker's experience. For example, projects may be classified as:

NOTES

- Low risk projects
- Medium risk projects
- High risk projects.

Low risk projects include replacement and modernisation projects. The decision maker can estimate the benefits (increase in revenue and/or reduction in costs) of replacement/modernisation projects with relative accuracy. Medium risk projects include investment for expansion of the current business. Although revenue and cost estimates are relatively difficult to make, yet the decision maker is familiar with the nature of businesses. Therefore, using his experience and judgment, he can have a reasonable idea of the variability of cash flows. High-risk projects include diversification into new businesses. As the decision maker has no or little idea of new business, he or she would find greater difficulty in estimating cash flows. Cash flows could show high variability. Within each category, projects could be further sub-divided. Figure 6.3 illustrates the *risk-adjusted discount rates* for projects classified according to their perceived risk.

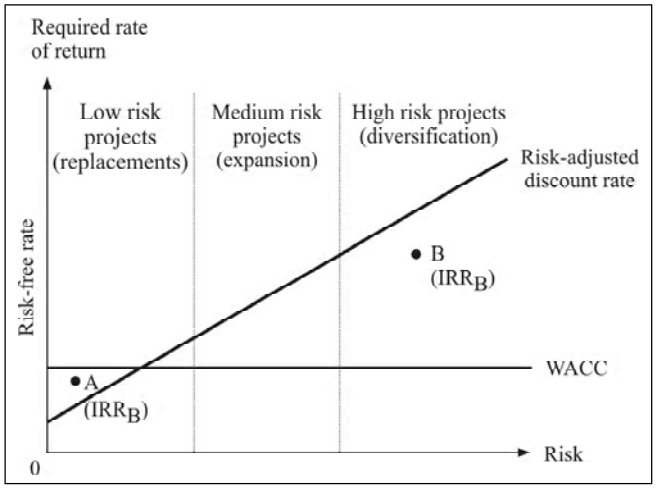


Figure 6.3: Risk-adjusted discount rates for projects

Figure 6.3 indicates that projects' risk differ, and higher the project risk, the higher will be the risk-adjusted discount rate. Replacement projects are discounted at a lower rate than expansion or diversification projects since its risk is the lowest. Diversification projects involve high risk; therefore, their cash flows are discounted at a high discount rate. It may be noted that WACC reflects, "average risk", therefore it is drawn as a horizontal line. It fails to distinguish between projects with different risk characteristics, and can mislead in undertaking profitable projects. For example, consider Projects *A* and *B* which respectively have internal rates of return, IRR_A and IRR_B. You can see from Figure 6.3 that if WACC criterion is used, Project *A* will be rejected (because IRR_A < WACC) and Project *B* will be accepted (because IRR_B > WACC). However, if risk-adjusted discount rates are used, then Project *A* should be accepted while Project *B* rejected. Note that discount rate must reflect risk of the project.

Check Your Progress

8. Why is it important to distinguish between a company risk and divisional risk?

6.14 LET US SUMMARIZE

❖ The cost of capital to a firm is the minimum return, which the suppliers of capital require. In other words, it is a price of obtaining capital; it is a compensation for time and risk.

NOTES

- The cost of capital concept is of vital significance in the financial decision-making. It is used: (*a*) as a discount, or cut-off, rate for evaluating investment projects, (*b*) for designing the firm's debt-equity mix and (*c*) for appraising the top management's financial performance.
- Firms obtain capital for financing investments in the form of equity or debt or both. Also, in practice, they maintain a target debt–equity mix. Therefore, the firm's cost of capital means the weighted average cost of debt and equity.
- Debt includes all interest-bearing borrowings. Its cost is the yield (return), which lenders expect from their investment. In most cases, return is equal to annual contractual rate of interest (also called coupon rate). Interest charges are tax deductible. Therefore, cost of debt to the firm should be calculated after adjusting for interest tax shield:

$$k_d(1-T)$$

  where k_d is before-tax cost of debt and T is the corporate tax rate.
- Equity includes paid-up capital and reserve and surplus (retained earnings). Equity has no explicit cost, as payment of dividends is not obligatory. However, it involves an opportunity cost.
- The opportunity cost of equity is the rate of return required by shareholders on securities of comparable risk. Thus, it is a price, which the company must pay to attract capital from shareholders.
- In practice, shareholders expect to receive dividends and capital gains. Therefore, the cost of equity can be thought to include expected dividend yield and percentage capital gain:

$$k_e = \frac{\text{DIV}_1}{P_0} + g$$

  where DIV_1 is the expected dividend per share, P_0 is the market price today and g is the expected dividend growth (capital gain). The dividend growth rate, g, can be calculated as the product of the firm's retention ratio and rate of return (ROE) in case of a totally equity financed firm. It can also be approximated by the past growth in earnings per share or dividend per share.
- When a company issues new share capital, it has to offer shares at a price, which is much less than the prevailing market price. Therefore, the cost of retained earnings will be less than the cost of new issue of equity.
- A more objective method for calculating the cost of equity is provided by CAPM:

$$k_e = R_f + (R_m - R_f)\beta_j$$

  where R_f is the risk-free rate equal to current yield on the Treasury bills or government bonds; $(R_m - R_f)$ is the market risk premium measured as average of historical returns of a long series; and β_j is the beta of the firm j.
- Three steps are involved in calculating the firm's weighted average cost of capital (WACC). First, the component costs of debt and equity are calculated. Second, weights to each component of capital are assigned according to the target capital structure. Third, the product of component costs and weights is summed up to determine WACC. The weighted average cost of new capital is the weighted marginal cost of capital (WMCC). WACC for a firm, which has debt and equity in the capital structure, is given by the following formula:

$$\text{WACC} = k_o = k_e\left(\frac{E}{E+D}\right) + k_d(1-T)\left(\frac{D}{E+D}\right)$$

  where k_e is the cost of equity, k_d is the cost of debt, T is the tax rate, D is debt and E is equity. The market value weights should be used in calculating WACC.

❖ A firm may have several divisions or product lines with different risks. Therefore, the firm's WACC cannot be used to evaluate divisions or projects. The following procedure can be used to estimate the divisional or the project's cost of capital:

- Identify comparable or pure-play firms and determine their equity beta based on the market data
- Find the average equity beta, and unlever it as follows:

$$\beta_u = \beta_l \left(\frac{E}{V} \right)$$

- Determine the division's target capital structure, and relever the beta as follows:

$$\beta_l = \beta_u \left(\frac{V}{E} \right) = \beta_u \left(1 + \frac{D}{E} \right)$$

- This is division or project's levered or equity beta. Use CAPM to calculate the cost of equity. Calculate the after-tax cost of debt for the division or project.
- Use the target capital structure to calculate the division or project's WACC.

NOTES

6.15 KEY CONCEPTS

Component cost of capital
Cost of debt
Cost of equity
Cost of preference capital
Cost of retained earnings
Divisional cost of capital
Earnings–price ratio
Explicit cost of capital
Financial risk
Financing policy
Firm's cost of capital
Flotation cost
Implicit cost of capital
Interest tax shield
Investment opportunity curve
Irredeemable
Marginal cost of capital
Opportunity cost of capital
Preference shares
Project cost of capital
Redeemable preference shares
Risk-adjusted discount rates
Sinking fund
Supernormal growth
Target capital structure
Weighted average cost of capital

6.16 ILLUSTRATIVE SOLVED PROBLEMS

Problem 6.1: Assuming that a firm pays tax at a 50 per cent rate, compute the after-tax cost of capital in the following cases:

(*i*) A 8.5 per cent preference share sold at par.

(*ii*) A perpetual bond sold at par, coupon rate of interest being 7 per cent.

(*iii*) A ten-year, 8 per cent, Rs 1000 par bond sold at Rs 950 less 4 per cent underwriting commission.

(*iv*) A preference share sold at Rs 100 with a 9 per cent dividend and a redemption price of Rs 110 if the company redeems it in five years.

(*v*) An ordinary share selling at a current market price of Rs 120, and paying a current dividend of Rs 9 per share, which is expected to grow at a rate of 8 per cent.

(*vi*) An ordinary share of a company, which engages no external financing, is selling for Rs 50. The earnings per share are Rs 7.50 of which sixty per cent is paid in dividends. The company reinvests retained earnings at a rate of 10 per cent.

Solution:

(*i*) The after-tax cost of the preference issue will be 8.5 per cent.

(*ii*) The after-tax cost of bond is:

$$k_d (1 - T) = 0.07(1 - 0.5) = 0.035 \text{ or } 3.5\%$$

(*iii*) The after-tax cost of bond is (using approximate method):

NOTES

$$\frac{(1-T)[\text{INT}+\frac{1}{n}(F-B_0)}{1/2(F+B_0)} = \frac{(1-0.5)\,[\text{Rs}\,80+1/10\,(\text{Rs}\,1000-\text{Rs}\,950)]}{1/2(\text{Rs}\,1000+\text{Rs}\,950)}$$

$$= \frac{(1-0.5)[\text{Rs}\,80+1/10(\text{Rs}\,50)]}{1/2(\text{Rs}\,1950)}$$

$$= \frac{(1-0.5)(\text{Rs}\,85)}{\text{Rs}\,975} = 0.0436 \text{ or } 4.36\%$$

Note: Flotation costs such as underwriting commission should be adjusted to the project's cash flows.

(*iv*) $100 = \sum_{t=1}^{5} \frac{9}{(1+k_p)^t} + \frac{110}{(1+k_p)^5}$

By trial and error, we find $k_p = 0.106$ or 10.6%

(*v*) $k_e = \frac{\text{DIV}_1}{P_0} + g = \frac{\text{Rs}\,9(1.08)}{\text{Rs}\,120} + 0.08 = \frac{\text{Rs}\,9.72}{\text{Rs}\,120} + 0.08$

$= 0.081 + 0.08 = 0.161$ or 16.1%

(*vi*) $P_0 = \frac{\text{EPS}\,(1-b)}{k_e - br}$

$k_e = \frac{\text{EPS}\,(1-b)}{P_0} + br = \frac{\text{Rs}\,7.50\,(1-0.4)}{\text{Rs}\,50} + 0.10 \times 0.4$

$= \frac{\text{Rs}\,4.50}{\text{Rs}\,50.00} + 0.04 = 0.09 + 0.04 = 0.13$ or 13 per cent

Problems 6.2: A firm finances all its investments by 40 per cent debt and 60 per cent equity. The estimated required rate of return on equity is 20 per cent after-taxes and that of the debt is 8 per cent after-taxes. The firm is considering an investment proposal costing Rs 40,000 with an expected return that will last forever. What amount (in rupees) must the proposal yield per year so that the market price of the share does not change? Show calculations to prove your point.

Solution: The minimum overall required rate of return is:

Debt	$0.40 \times 0.08 = 0.032$
Equity	$0.60 \times 0.20 = 0.120$
Weighted average	0.152

Thus, the investment proposal must earn $0.152 \times$ Rs 40,000 = Rs 6,080 per year.

Annual return before taxes	Rs 6,080
Less: interest $0.08 \times 0.40 \times$ Rs 40,000	1,280
Return on equity	Rs 4,800

After-tax rate of return on equity:

Rs 4,800 ÷ (0.60 × Rs 40,000)

Rs 4,800 ÷ Rs 24,000 = 0.20

Problems 6.3: The Servex Company has the following capital structure on 30 June 2004:

	(Rs '000)
Ordinary shares (200,000 shares)	4,000
10% Preference shares	1,000
14% Debentures	3,000
	8,000

The share of the company sells for Rs 20. It is expected that company will pay next year a dividend of Rs 2 per share, which will grow at 7 per cent forever. Assume a 50 per cent tax rate.

NOTES

You are required to:

(*a*) Compute a weighted average cost of capital based on the existing capital structure.

(*b*) Compute the new weighted average cost of capital if the company raises an additional Rs 2,000,000 debt by issuing 15 per cent debenture. This would result in increasing the expected dividend to Rs 3 and leave the growth rate unchanged, but the price of share will fall to Rs 15 per share.

(*c*) Compute the cost of capital if in (*b*) above growth rate increases to 10 per cent.

Solution:

(*a*) WACC: Existing capital structure

	After-tax Cost	*Weights*	*Weighted Cost*
Ordinary	0.17	0.500	0.0850
10% Preference	0.10	0.125	0.0125
14% Debenture	0.07	0.375	0.0262
WACC			0.1237

Cost of ordinary share is:

$$k_e = \frac{\text{DIV}_1}{P_0} + g = \frac{\text{Rs}\,2}{\text{Rs}\,20} + 0.07 = 0.10 + 0.07 = 0.17$$

(*b*) WACC: New capital structure

	Amount	*After-tax (Rs '000)*	*Weights Cost*	*Weighted Cost*
Ordinary	4,000	0.27	0.40	0.108
10% Preference	1,000	0.10	0.10	0.010
14% Debentures	3,000	0.07	0.30	0.021
15% Debentures	2,000	0.075	0.20	0.015
WACC				0.154

Cost of ordinary share is:

$$k_e = \frac{\text{DIV}_1}{P_0} + g = \frac{\text{Rs}\,3}{\text{Rs}\,15} + 0.07 = 0.20 + 0.07 = 0.27$$

(*c*) WACC: Changed growth rate

	After-tax Cost	*Weights*	*Weighted Cost*
Ordinary	0.30	0.40	0.120
10% Preference	0.10	0.10	0.010
14% Debentures	0.07	0.30	0.021
15% Debentures	0.075	0.20	0.015
WACC			0.166

Cost of ordinary share is:

$$k_e = \frac{\text{DIV}_1}{P_0} + g = \frac{\text{Rs}\,3}{\text{Rs}\,15} + 0.10 = 0.20 + 0.10 = 0.30$$

Note: The book value weights have been used to calculate the weighted cost of capital in the above cases.

NOTES

Problem 6.4: The Kay Company has the following capital structure at 31 March 2003 which is considered to be optimum.

	Rs
14% Debentures	300,000
11% Preference	100,000
Equity (1,00,000 shares)	1,600,000
	2,000,000

The company's share has a current market price of Rs 23.60 per share. The expected dividend per share next year is 50 per cent of the 2003 EPS. The following are the earnings per share figure for the company during the preceding ten years. The past trends are expected to continue.

Year	*EPS (Rs)*	*Year*	*EPS (Rs)*
1994	1.00	1999	1.61
1995	1.10	2000	2000
1996	1.21	2001	1.95
1997	1.33	2002	2.15
1998	1.46	2003	2.36

The company can issue 16 per cent new debentures. The company's debenture is currently selling at Rs 96. The new preference issue can be sold at a net price of Rs 9.20, paying a dividend of Rs 1.1 per share. The company's marginal tax rate is 50 per cent.

(*a*) Calculate the after-tax cost (*i*) of new debt, (*ii*) of new preference capital and (*iii*) of ordinary equity, assuming new equity comes from retained earnings.

(*b*) Find the marginal cost of capital, again assuming no new ordinary shares are sold.

(*c*) How much can be spent for capital investment before new ordinary shares must be sold? Assume that retained earnings available for next year's investment are 50 per cent of 2003 earnings.

(*d*) What is the marginal cost of capital (cost of funds raised in excess of the amount calculated in part (*c*) if the firm can sell new ordinary shares to net Rs 20 a share? The cost of debt and of preference capital is constant.

Solution: The existing capital structure of the firm is assumed to be optimum. Thus, the optimum proportions are:

Type of Capital	***Amount (Rs)***	***Proportions***
14% Debentures	300,000	0.15
11% Preference	100,000	0.05
Equity	1,600,000	0.80
	2,000,000	1.00

(*a*) (*i*) After-tax cost of debt:

$$k_d = \frac{\text{Rs}16}{\text{Rs}96} = 0.1667$$

$$k_d(1-T) = (1-0.5)(0.1667) = 0.0833$$

Note: The above formula is used since the maturity period of the debentures is not given.

(*ii*) After-tax cost of preference capital:

$$k_p = \frac{\text{Rs}1.1}{\text{Rs}9.2} = 0.12$$

Note: Preference shares are assumed to be irredeemable.

(*iii*) After-tax cost of retained earnings:

$$k_e = \frac{\text{DIV}_1}{P_0} + g = \frac{\text{Rs}\,1.18}{\text{Rs}\,23.60} + 0.10 = 0.05 + 0.10 = 0.15$$

$$\text{DIV}_1 = 50\%\ \text{of 2003 EPS} = 50\%\ \text{of Rs}\,2.36 = \text{Rs}\,1.18$$

Calculation of g: It can be observed from the past trends of EPS that it is growing at an annual compound rate of 10 per cent. For example $E_t = E_0\,(1 + g)^t$ = Rs 2.36 = Re 1 $(1 + g)^9$. Using Table A, we find that the present value factor of 2.36 at the end of 9th year is obtained when the interest rate is 10 per cent. The growth rate is, therefore, 10 per cent.

Type of Capital ***(1)***	***Proportion*** ***(2)***	***Specific Cost*** ***(3)***	***Product*** ***(2) × (3) = (4)***
Debt	0.15	0.0833	0.0125
Preference	0.05	0.1200	0.0060
Equity	0.80	0.1500	0.1200
Marginal cost of capital			0.1385

(*b*) The marginal cost of capital (MCC) is the weighted average cost of new capital. The firm would maintain its existing capital structure. Therefore, new capital would be raised in proportion to the existing capital structure.

(*c*) The company can spend the following amount without increasing its MCC and without selling the new shares:

$$\text{Retained earnings} = (0.50)(\text{Rs}\ 2.36 \times 100{,}000) = \text{Rs}\,118{,}000;$$

The ordinary equity (retained earnings in this case) is 80 per cent of the total capital. Thus

$$\text{Investment before issue of equity} = \frac{\text{Retained earnings}}{\text{Per cent equity}}$$

$$= \frac{\text{Rs}\,118{,}000}{0.80} = \text{Rs}\,147{,}500$$

(d) If the company spends more than Rs 147,500, it will have to issue new shares. The cost of new issue of ordinary shares is:

$$k_e = \frac{\text{Rs}\,1.18}{\text{Rs}\,20} + 0.10 = 0.059 + 0.10 = 159$$

The marginal cost of capital in excess of Rs 147,500 is:

Type of Capital	*Proportion*	*Specific Costs*	*Product*
Debt	0.15	0.0833	0.0125
Preference	0.05	0.1200	0.0060
Ordinary Equity (new)	0.80	0.1590	0.1272
			0.1457

6.17 ANSWERS TO 'CHECK YOUR PROGRESS'

1. The concept of the cost of capital is important for a number of reasons. The cost of capital may be used for evaluating investment decisions, designing a firm's debt policy, and appraising the financial performance of top management. While evaluating investment decisions, the cost of capital may be defined as the minimum required rate of return on an investment project. The cost of capital is also known as the cut-off rate, or the hurdle rate.

NOTES

NOTES

2. A firm has to choose between alternate investment opportunities. The firm also has to deal with different levels of risks in respect of the projects being considered. Therefore, once a firm decides to invest in a particular project, it loses the opportunity of investing in another project. This is because the amount of available funds is limited. The opportunity cost is the rate of return foregone on the next best alternative investment opportunity of comparable risk.
3. A debt instrument may be issued at a premium or a discount. At a certain level of interest, the lower the issue price, the higher will be the before tax cost of debt. The interest paid on debt is tax deductible. In fact, the higher the interest charges, the lower will be the amount of tax payable by the firm. This basically means that the government bears a part of the interest paid to the investor. This is known as the interest tax shield. Thus, the after tax cost of debt = before cost of debt (1-tax rate)
4. Unlike debt, the failure to pay dividends in the case of preference capital does not cause bankruptcy. However, non-payment of dividends in the case of preference capital may cause serious damage to a company's credit standing. The main difference in the case of preference capital is that the cost of preference capital or dividends, unlike interest in the case of debt, is not adjusted for taxes because preference dividend is paid after corporate taxes have been paid.
5. Internal equity is raised by firms by retaining earnings. On the other hand, the firm may issue new shares to the public in order to raise external equity. This involves floatation costs. Further, the firm may have to issue the new shares at a price lower than the current market price. Thus, external equity will generally cost more to the firm than internal equity.
6. Beta of a firm's share may be defined as the systematic risk of an ordinary share in relation to the market. In order to simplify the calculations, a broad based index like the BSE's Sensitivity (Sensex) Index is used as a proxy for the market.
7. A firm avails of capital from various sources. On account of risk differences as well as the contractual agreements between the firm and the investors, the cost of capital of each source of capital is different. The amount obtained from each source of capital is also different. We therefore need to arrive at the combined cost of capital of all the sources of finance to obtain the average cost of capital. This overall cost is also known as the weighted average cost of capital (WACC). It should also be remembered that the market value weights need to be used to calculate WACC.
8. The risk of an investment project is composed of a risk free rate plus a risk premium rate. The greater the risk of an investment in a project, the greater will be the risk premium required by investors. In a firm which is not a single division firm, the required rate of return of a particular division or a project will depend on its risk. Since investors are risk averse, divisions and projects with differing risks need to be evaluated using their risk-adjusted required rates of return.

6.18 QUESTIONS AND EXERCISES

Review Questions

1. Define cost of capital? Explain its significance in financial decision-making.
2. What are the various concepts of cost of capital? Why should they be distinguished in financial management?
3. How is the cost of debt computed? How does it differ from the cost of preference capital?
4. 'The equity capital is cost free.' Do you agree? Give reasons.
5. The basic formula to calculate the cost of equity is: $(DIV_1 / P_0) + g$. Explain its rationale.
6. Are retained earnings less expensive than the new issue of ordinary shares? Give your views.

NOTES

7. What is the CAPM approach for calculating the cost of equity? What is the difference between this approach and the constant growth approach? Which one is better? Why?
8. 'Debt is the cheapest source of funds.' Explain.
9. How is the weighted average cost of capital calculated? What weights should be used in its calculation?
10. Distinguish between the weighted average cost of capital and the marginal cost of capital. Which one should be used in capital budgeting and valuation of the firm? Why?
11. 'Marginal cost of capital is nothing but the average cost of capital.' Explain.
12. How would you apply the cost of capital concept when projects with different risks are evaluated?

Exercises

1. The Ess Kay Refrigerator Company is deciding to issue 2,000,000 of Rs 1,000, 14 per cent 7-year debentures. The debentures will have to be sold at a discount rate of 3 per cent. Further, the firm will pay an underwriting fee of 3 per cent of the face value. Assume a 35% tax rate.

   Calculate the after-tax cost of the issue. What would be the after-tax cost if the debenture were sold at a premium of Rs 30?

2. A company issues new debentures of Rs 2 million, at par; the net proceeds being Rs 1.8 million. It has a 13.5 per cent rate of interest and 7 year maturity. The company's tax rate is 52 per cent. What is the cost of debenture issue? What will be the cost in 4 years if the market value of debentures at that time is Rs 2.2 million?
3. A company has 100,000 shares of Rs 100 at par of preference shares outstanding at 9.75 per cent dividend rate. The current market price of the preference share is Rs 80. What is its cost?
4. A firm has 8,000,000 ordinary shares outstanding. The current market price is Rs 25 and the book value is Rs 18 per share. The firm's earnings per share is Rs 3.60 and dividend per share is Rs 1.44. How much is the growth rate assuming that the past performance will continue? Calculate the cost of equity capital.
5. A company has 5,000,000 ordinary shares outstanding. The market price of the share is Rs 96 while the book value is Rs 65. The firm's earnings and dividends per share are Rs 10 and Rs 7 respectively. The company wants to issue 1,000,000 shares with a net proceeds of Rs 80 per share. What is the cost of capital of the new issue?
6. A company has paid a dividend of Rs 3 per share for last 20 years and it is expected to continue so in the future. The company's share had sold for Rs 33 twenty years ago, and its market price is also Rs 33. What is the cost of the share?
7. A firm is thinking of raising funds by the issuance of equity capital. The current market price of the firm's share is Rs 150. The firm is expected to pay a dividend of Rs 3.55 next year. The firm has paid dividend in past years as follows:

Year	*Dividend per Share (Rs)*
1998	2.00
1999	2.20
2000	2.42
2001	2.66
2002	2.93
2003	3.22

   The firm can sell shares for Rs 140 each only. In addition, the flotation cost per share is Rs 10. Calculate the cost of new issue.

NOTES

8. A company is considering the possibility of raising Rs 100 million by issuing debt, preference capital, and equity and retaining earnings. The book values and the market values of the issues are as follows:

(Rs in millions)

	Book Value	*Market Value*
Ordinary shares	30	60
Reserves	10	—
Preference shares	20	24
Debt	40	36
	100	120

The following costs are expected to be associated with the above-mentioned issues of capital. (Assume a 35 per cent tax rate.)

(*i*) The firm can sell a 20-year Rs 1,000 face value debenture with a 16 per cent rate of interest. An underwriting fee of 2 per cent of the market price would be incurred to issue the debentures.

(*ii*) The 11 per cent Rs 100 face value preference issue fetch Rs 120 per share. However, the firm will have to pay Rs 7.25 per preference share as underwriting commission.

(*iii*) The firm's ordinary share is currently selling for Rs 150. It is expected that the firm will pay a dividend of Rs 12 per share at the end of the next year, which is expected to grow at a rate of 7 per cent. The new ordinary shares can be sold at a price of Rs 145. The firm should also incur Rs 5 per share flotation cost.

Compute the weighted average cost of capital using (*i*) book value weights (*ii*) market value weights.

9. A company has the following long-term capital outstanding as on 31 March 2003: (*a*) 10 per cent debentures with a face value of Rs 500,000. The debentures were issued in 1999 and are due on 31 March 2008. The current market price of a debenture is Rs 950. (*b*) Preference shares with a face value of Rs 400,000. The annual dividend is Rs 6 per share. The preference shares are currently selling at Rs 60 per share. (*c*) Sixty thousand ordinary shares of Rs 10 par value. The share is currently selling at Rs 50 per share. The dividends per share for the past several years are as follow:

Year	***Rs***	***Year***	***Rs***
1996	2.00	2000	2.80
1997	2.16	2001	3.08
1998	2.37	2002	3.38
1999	2.60	2003	3.70

Assuming a tax rate of 35 per cent, compute the firm's weighted average cost of capital.

10. A company is considering distributing additional Rs 80,000 as dividends to its ordinary shareholders. The shareholders are expected to earn 18 per cent on their investment. They are in 30 per cent tax and incur an average brokerage fee of 3 per cent on the reinvestment of dividends received. The firm can earn a return of 12 per cent on the retained earnings. Should the company distribute or retain Rs 80,000?

11. The Keshari Engineering Ltd. has the following capital structure, considered to be optimum, on 31 June 2003.

	Rs in million
14% Debt	93.75
10% Preference	31.25
Ordinary equity	375.00
Total	500.00

NOTES

The company has 15 million shares outstanding. The share is selling for Rs 25 per share and the expected dividend per share is Rs 1.50, which is expected to grow at 10 per cent.

The company is contemplating to raise additional funds of Rs 100 million to finance expansion. It can sell new preference shares at a price of Rs 23, less flotation cost of Rs 3 per share. It is expected that a dividend of Rs 2 per share will be paid on preference. The new debt can be issued at 10 per cent rate of interest. The firm pays taxes at rate of 35 per cent and intends to maintain its capital structure.

You are required (*i*) to calculate the after-tax cost (*a*) of new debt, (*b*) of new preference capital, and (*c*) of ordinary equity, assuming new equity comes only from retained earnings which is just sufficient for the purpose, (*ii*) to calculate the marginal cost of capital, assuming no new shares are sold, (*iii*) to compute the maximum amount which can be spent for capital investments before new ordinary shares can be sold, if the retained earnings are Rs 700,000, and (*iv*) to compute the marginal cost of capital if the firm spends in excess of the amount computed in (*iii*). The firm can sell ordinary shares at a net price of Rs 22 per share.

12. The following is the capital structure of *X* Ltd. as on 31 December 2003.

	Rs in million
Equity capital (paid up)	563.50
Reserves and surplus	485.66
10% Irredeemable Preference shares	56.00
10% Redeemable Preference shares	28.18
15% Term loans	377.71
Total	1,511.05

The share of the company is currently selling for Rs 36. The expected dividend next year is Rs 3.60 per share anticipated to be growing at 8 per cent indefinitely. The redeemable preference shares were issued on 1 January 1997 with twelve-year maturity period. A similar issue today will be at Rs 93. The market price of 10% irredeemable preference share is Rs 81.81. The company had raised the term loan from IDBI in 1993. A similar loan will cost 10% today.

Assume an average tax rate of 35 per cent. Calculate the weights average cost of capital for the company using book-value weights.

13. The following capital structure is extracted from Delta Ltd.'s balance sheet as on 31 March 2003:

	Rs in million
Equity (Rs 25 par)	66,412
Reserves	65,258
Preference (Rs 100 par)	3,000
Debentures	30,000
Long-term loans	5,360
	170,030

The earnings per share of the company over the period 1999–2003 are:

Year	***Rs***	***Year***	***Rs***
1999	2.24	1994	4.40
2000	3.00	1995	5.15
2001	4.21	1996	5.05
2002	3.96	1997	6.00
2003	4.80	1998	6.80

The equity share of the company is selling for Rs 50 and preference for Rs 77.50. The preference dividend rate and interest rate on debenture respectively are 10 per cent and 13

NOTES

per cent. The long-term loans are raised at an interest rate of 14 per cent from the financial institution. The equity dividend is Rs 4 per share.

Calculate the weighted average cost of capital for Delta Ltd., making necessary assumptions.

14. A company has the following capital structure at the end of 31 March 2003:

	Rs in million
Share Capital	6,808
Reserve	34,857
Long-term loans	538,220

The company's EPS, DPS, average market price and ROE for last seven years are given below:

Year	*EPS*	*DPS*	*AMP*	*ROE*
1997	21.55	5.28	143.04	20.9
1998	22.14	5.76	187.52	18.6
1999	26.40	5.76	312.32	11.7
2000	20.16	6.53	587.52	11.0
2001	20.40	7.68	366.72	9.5
2002	23.09	11.53	416.64	10.3
2003	22.00	7.68	355.20	8.4

Note: EPS, DPS and AMP adjusted for bonus issues.

You are required to calculate: (*a*) growth rate *g*, using alternative methods; (*b*) cost of equity, using dividend – growth model, and (*c*) weighted average cost of capital, using (*i*) book-value weights and (*ii*) market-value weights. Assume that the interest rate on debt is 11 per cent and the corporate income tax rate is 35 per cent.

15. Eskayef Limited manufactures human and veterinary pharmaceuticals, bulk drugs, skin care products, and vaterinary feed supplements and markets bio-analytical and diagnostic instruments. On 31 March 2003, the company has a paid-up share capital of Rs 75 million and reserves of Rs 325.90 million. It does not employ long-term debt. The following are other financial highlights on the company during 1998–2003:

Year	*EPS (Rs)*	*DPS (Rs)*	*Book Value (Rs)*	*Market Value*
1998	6.21	2.00	26.03	100.00
1999	10.91	2.50	34.44	205.00
2000	11.57	2.50	43.52	209.38
2001	11.47	2.70	37.98	164.00
2002	10.44	3.00	45.42	138.88
2003	11.23	3.20	53.45	155.00

Note: (1) Years 1998, 1999 and 2000 closed on 30 November while years 2001, 2002 and 2003 on 31 March. (2) Market value is the averages of high and low share prices.

You are required to calculate (*a*) ROE, (*b*) dividend payout, (*c*) retention ratio, (*d*) growth rate, (*e*) dividend yield, (*f*) earnings yield and (*g*) cost of equity.

UNIT 7 FINANCIAL AND OPERATING LEVERAGE

NOTES

Structure

7.0 INTRODUCTION

Given the capital budgeting decision of a firm, it has to decide the way in which the capital projects will be financed. Every time the firm makes an investment decision, it is at the same time making a financing decision also. For example, a decision to build a new plant or to buy a new machine implies specific way of financing that project. Should a firm employ equity or debt or both? What are implications of the debt-equity mix? What is an appropriate mix of debt and equity?

7.1 UNIT OBJECTIVES

Explain the concept of financial leverage

- Discuss the alternative measures of financial leverage
- Understand the risk and return implications of financial leverage
- Analyse the combined effect of financial and operating leverage
- Highlight the difference between operating risk and financial risk

7.2 CAPITAL STRUCTURE DEFINED

The assets of a company can be financed either by increasing the owners' claims or the creditors' claims. The owners' claims increase when the firm raises funds by issuing ordinary shares or by retaining the earnings; the creditors' claims increase by borrowing. The various means of financing represent the **financial structure** of an enterprise. The left-hand side of the balance sheet (liabilities

NOTES

plus equity) represents the financial structure of a company.[1] Traditionally, short-term borrowings are excluded from the list of methods of financing the firm's capital expenditure, and therefore, the long-term claims are said to form the **capital structure** of the enterprise. The term capital structure is used to represent the proportionate relationship between debt and equity. Equity includes paid-up share capital, share premium and reserves and surplus (retained earnings).

The management of a company should seek answers to the following questions while making the financing decision:

- How should the investment project be financed?
- Does the way in which the investment projects are financed matter?
- How does financing affect the shareholders' risk, return and value?
- Does there exist an optimum financing mix in terms of the maximum value to the firm's shareholders?
- Can the optimum financing mix be determined in practice for a company?
- What factors in practice should a company consider in designing its financing policy?

7.3 MEANING OF FINANCIAL LEVERAGE

As stated earlier, a company can finance its investments by debt and equity. The company may also use preference capital. The rate of interest on debt is fixed irrespective of the company's rate of return on assets. The company has a legal binding to pay interest on debt. The rate of preference dividend is also fixed; but preference dividends are paid when the company earns profits. The ordinary shareholders are entitled to the residual income. That is, earnings after interest and taxes (less preference dividends) belong to them. The rate of the equity dividend is not fixed and depends on the dividend policy of a company.

The use of the fixed-charges sources of funds, such as debt and preference capital along with the owners' equity in the capital structure, is described as **financial leverage** or **gearing** or **trading on equity**. The use of the term trading on equity is derived from the fact that it is the owner's equity that is used as a basis to raise debt; that is, the equity that is traded upon. The supplier of debt has limited participation in the company's profits and, therefore, he will insist on protection in earnings and protection in values represented by ownership equity.[2]

The financial leverage employed by a company is intended to earn more return on the fixed-charge funds than their costs. The surplus (or deficit) will increase (or decrease) the return on the owners' equity. The rate of return on the owners' equity is levered above or below the rate of return on total assets. For example, if a company borrows Rs 100 at 8 per cent interest (that is, Rs 8 per annum) and invests it to earn 12 per cent return (that is, Rs 12 per annum), the balance of 4 per cent (Rs 4 per annum) after payment of interest will belong to the shareholders, and it constitutes the profit from financial leverage. On the other hand, if the company could earn only a return of 6 per cent on Rs 100 (Rs 6 per annum), the loss to the shareholders would be Rs 2 per annum. Thus, financial leverage at once provides the potentials of increasing the shareholders' earnings as well as creating the risks of loss to them. It is a double-edged sword. The following statement very well summarises the concept of financial leverage:[3]

This role of financial leverage suggests a lesson in physics, and there might be some point in considering the rate of interest paid as the fulcrum used in applying forces through leverage. At least it suggests consideration of pertinent variables; the lower the interest rate, the greater will be the profit, and the less the chance of loss; the less the amount borrowed the lower will be the profit or loss; also, the greater the borrowing, the greater the risk of unprofitable leverage and the greater the chance of gain.

Check Your Progress

1. Define the term financial leverage.

1. In USA the right-hand side of the balance sheet is used to show liabilities and equity.
2. Waterman, Merwin H., Trading on Equity, in Eitman, W.J. (ed.), *Essays on Business Finance*, Masterco Press, 1953.
3. *Ibid*.

7.4 MEASURES OF FINANCIAL LEVERAGE

NOTES

The most commonly used measures of financial leverage are:[4]

1. ***Debt ratio*** The ratio of debt to total capital, i.e.,

$$L_1 = \frac{D}{D+E} = \frac{D}{V}$$

where D is value of debt, E is value of shareholders' equity and V is value of total capital (i.e., $D+E$). D and E may be measured in terms of book value. The book value of equity is called net worth. Shareholder's equity may be measured in terms of market value.

2. ***Debt-equity ratio*** The ratio of debt to equity, i.e.,

$$L_2 = \frac{D}{E} \tag{1}$$

3. ***Interest coverage*** The ratio of net operating income (or EBIT) to interest charges, i.e.,[5]

$$L_3 = \frac{\text{EBIT}}{\text{Interest}} \tag{2}$$

The first two measures of financial leverage can be expressed either in terms of book values or market values. The market value to financial leverage is theoretically more appropriate because market values reflect the current attitude of investors. But it is difficult to get reliable information on market values in practice. The market values of securities fluctuate quite frequently.

There is no difference between the first two measures of financial leverage in operational terms. They are related to each other in the following manner.[6]

$$L_1 = \frac{L_2}{1+L_2} = \frac{D/E}{1+D/E} = \frac{D}{V} \tag{3}$$

$$L_2 = \frac{L_1}{1-L_1} = \frac{D/V}{1-D/V} = \frac{D}{E} \tag{4}$$

These relationships indicate that both these measures of financial leverage will rank companies in the same order. However, the first measure (i.e. D/V) is more specific as its value will range between zero to one. The value of the second measure (i.e. D/E) may vary from zero to any large number. The debt-equity ratio, as a measure of financial leverage, is more popular in practice. There is usually an accepted industry standard to which the company's debt-equity ratio is compared. The company will be considered risky if its debt-equity ratio exceeds the industry standard. Financial institutions and banks in India also focus on debt-equity ratio in their lending decisions.

4. Bierman, H., Jr., *Financial Policy*, Macmillan, 1970.
5. Fixed charges may also include sinking funds (SF). Then the ratio will be as follows:

$$L_3 = \frac{\text{EBIT}}{\text{Interest} + (\text{Sinking fund}/1 - \text{Tax rate})}$$

Depreciations, being a non-cash item, may be included in the numerator of the equation.

6. Since, $L_1 = \frac{D}{D+E} = \frac{D}{V}$ then $D = L_1 V$. Similarly, since $L_2 = \frac{D}{E}$, then $D = L_2 E$.

Thus, $L_1 V = L_2 E, L_1 = L_2 \frac{E}{V} = L_2 \frac{V-D}{V}$ or $L_1 = L_2 - L_2 \frac{D}{V}$ or $L_1 = L_2 - L_2 L_1$.

Since, $\frac{D}{V} = L_1$ or $L_1 = \frac{L_2}{(1+L_2)}$ or $L_2 = \frac{L_1}{(1-L_1)}$.

NOTES

The first two measures of financial leverage are also measures of **capital gearing**. They are static in nature as they show the borrowing position of the company at a point of time. These measures, thus, fail to reflect the level of financial risk, which is inherent in the possible failure of the company to pay interest and repay debt.

The third measure of financial leverage, commonly known as **coverage ratio**, indicates the capacity of the company to meet fixed financial charges. The reciprocal of interest coverage, that is, interest divided by EBIT, is a measure of the firm's **income gearing**. Again by comparing the company's coverage ratio with an accepted industry standard, investors can get an idea of financial risk. However, this measure suffers from certain limitations.[7] *First*, to determine the company's ability to meet fixed financial obligations, it is the cash flow information, which is relevant, not the reported earnings. During recessionary economic conditions, there can be wide disparity between the earnings and the net cash flows generated from operations. *Second*, this ratio, when calculated on past earnings, does not provide any guide regarding the future riskiness of the company. *Third*, it is only a measure of short-term liquidity rather than of leverage.

7.4.1 Financial Leverage of Companies in India

How much financial leverage do Indian companies employ? Companies differ in the use of financial leverage since it depends on a number of factors such as the size, nature of product, capital intensity, technology, market conditions, management attitude etc. In Table 7.1, we provide the measures of financial leverage for a few largest companies in India for the year ending on 31 March 2004. As you may observe companies show wide variations in the use of financial leverage. Infosys does not use any debt. SAIL's debt ratio is highest and because of its low EBIT, it does not provide much coverage to debt holders.

Table 7.1: Financial Leverage of Largest Indian Companies, 2004

Company	*Capital Gearing Debt ratio*	*Income Gearing Debt-equity ratio*	*Interest coverage*	*Interest to EBIT ratio*
1. Indian Oil	0.346	0.530	23.6	0.042
2. HPCL	0.180	0.220	54.6	0.018
3. BPCL	0.315	0.459	26.0	0.038
4. SAIL	0.862	6.247	0.81	1.237
5. ONGC	0.022	0.022	331.00	0.003
6. Tata Motors	0.261	0.353	16.7	0.060
7. TISCO	0.436	0.774	12.1	0.083
8. BHEL	0.101	0.112	15.4	0.065
9. Reliance	0.398	0.660	5.4	0.186
10. L&T	0.329	0.491	11.8	0.085
11. HLL	0.441	0.797	35.1	0.029
12. Infosys	0.000	0.000	NA*	NA*
13. Voltas	0.306	0.440	8.1	0.124

* *NA* = not applicable.

Source: CMIE database.

7.5 FINANCIAL LEVERAGE AND THE SHAREHOLDERS' RETURN

Check Your Progress

2. What are the common measures of financial leverage?

The primary motive of a company in using financial leverage is to magnify the shareholders' return under favourable economic conditions. The role of financial leverage in magnifying the

7. Bierman, op. cit., p. 89.

return of the shareholders is based on the assumptions that the fixed-charges funds (such as the loan from financial institutions and banks or debentures) can be obtained at a cost lower than the firm's rate of return on net assets (RONA or ROI). Thus, when the difference between the earnings generated by assets financed by the fixed-charges funds and costs of these funds is distributed to the shareholders, the earnings per share (EPS) or return on equity (ROE) increases. However, EPS or ROE will fall if the company obtains the fixed-charges funds at a cost higher than the rate of return on the firm's assets. It should, therefore, be clear that EPS, ROE and ROI are the important figures for analysing the impact of financial leverage.

7.5.1 EPS and ROE Calculations

EPS is calculated by dividing profit after taxes, PAT, (also called net income, NI) by the number of shares outstanding. PAT is found out in two steps. First, the interest on debt, INT, is deducted from the earnings before interest and taxes, EBIT, to obtain the profit before taxes, PBT. Then, taxes are computed on and subtracted from PBT to arrive at the figure of PAT. The formula for calculating EPS is as follows:[8]

$$\text{Earnings per share} = \frac{\text{Profit after tax}}{\text{Number of shares}}$$

$$\text{EPS} = \frac{\text{PAT}}{N} = \frac{(\text{EBIT} - \text{INT})(1 - T)}{N} \tag{5}$$

where T is the corporate tax rate and N is the number of ordinary shares outstanding. If the firm does not employ any debt, then the formula is:

$$\text{EPS} = \frac{\text{EBIT}(1 - T)}{N} \tag{6}$$

ROE is obtained by dividing PAT by equity (E). Thus, the formula for calculating ROE is as follows:[9]

$$\text{Return on equity} = \frac{\text{Profit after tax}}{\text{Value of equity}}$$

$$\text{ROE} = \frac{(\text{EBIT} - \text{INT})(1 - T)}{E} \tag{7}$$

For calculating ROE either the book value or the market value equity may be used.

How does the financial leverage affect EPS and ROE? We shall describe two situations to illustrate the impact of the financial leverage on EPS and ROE. First, we shall analyse the impact of the alternative financial plans on EPS and ROE assuming that EBIT is constant. Second, we shall assume that EBIT varies and shows the effect of the alternative financial plans on EPS and ROE under the conditions of varying EBIT.

7.5.2 Analysing Alternative Financial Plans: Constant EBIT

Suppose a new firm, the Brightways Ltd., is being formed. The management of the firm is expecting a before-tax rate of return of 24 per cent on the estimated total investment of Rs 500,000. This implies EBIT = Rs 500,000 × 0.24 = Rs 120,000. The firm is considering two alternative financial plans: (*i*) either to raise the entire funds by issuing 50,000 ordinary shares at Rs 10 per share, or (*ii*) to raise Rs 250,000 by issuing 25,000 ordinary shares at Rs 10 per share and borrow Rs 250,000 at 15 per cent rate of interest. The tax rate is 50 per cent. What are the effects of the alternative plans for the shareholders' earnings? Table 7.2 shows calculations.

8. If a company uses preference capital, then EPS may be calculated as follows:

$$\text{EPS} = \frac{(\text{EBIT} - \text{INT})(1 - T) - \text{PDIV}}{N}$$

Notice that PDIV, the preference dividend, is not tax deductible.

9. ROE can also be found out by dividing the earnings per share by the equity capital (book value) per share.

NOTES

Table 7.2: Effect of Financial Plan on EPS and ROE: Constant EBIT

	Financial Plan	
	Debt-equity (Rs)	***All-equity (Rs)***
1. Earnings before interest and taxes, EBIT	120,000	120,000
2. *Less:* Interest, INT	0	37,500
3. Profit before taxes, PBT = EBIT – INT	120,000	82,500
4. *Less:* Taxes, T (EBIT – INT)	60,000	41,250
5. Profit after taxes, PAT = (EBIT – INT) (1 – T)	60,000	41,250
6. Total earnings of investors, PAT + INT	60,000	78,750
7. Number of ordinary shares, N	50,000	25,000
8. EPS = (EBIT – INT) (1 – T)/N	1.20	1.65
9. ROE = (EBIT – INT) (1 – T)/E	12.0%	16.5%

From Table 7.2, we see that the impact of the financial leverage is quite significant when 50 per cent debt (debt of Rs 250,000 to total capital of Rs 500,000) is used to finance the investment. The firm earns Rs 1.65 per share, which is 37.5 per cent more than Rs 1.20 per share earned with no leverage. ROE is also greater by the same percentage.

Table 7.3: Gain from Financial Leverage

	Rs
1. EBIT on assets financed by debt, Rs 250,000 × 0.24	60,000
2. *Less:* Interest, Rs 250,000 × 0.15	37,500
3. Surplus earnings to the shareholders, Rs 250,000 × (0.24 – 0.15)	22,500
4. *Less:* Taxes at 50 per cent	11,250
5. After tax surplus earnings accruing to the shareholders (leverage gain)	11,250

EPS is greater under the debt-equity plan for two reasons. First, under this plan, the firm is able to borrow half of its funds requirements at a cost (15 per cent) lower than its rate of return on total investment (24 per cent). Thus, it pays a 15 per cent (or 7.5 per cent after tax) interest on the debt of Rs 250,000 while earns a return of 24 per cent (or 12 per cent after tax) by investing this amount. The difference of 9 per cent (or 4.5 per cent after tax) accrues to the shareholders as owners of the firm without any corresponding investment. The difference in terms of rupees is Rs 22,500 before taxes and Rs 11,250 after taxes. Thus, the gain from the financial leverage is as shown in Table 7.3.

Second, under the debt-equity plan, the firm has only 25,000 shares as against 50,000 shares under the all-equity plan. Consequently, the after-tax favourable leverage of Rs 11,250 dividend by 25,000 shares increases EPS by Re 0.45 from Rs 1.20 to Rs 1.65.

7.5.3 Interest Tax Shield

Another important way of explaining the effect of debt is to see the impact of the interest charges on the firm's tax liability. The interest charges are tax deductible and, therefore, provide tax shield, which increases the earnings of the shareholders. See line 6 in Table 7.2 that compares the total earnings of all investors (shareholders as well debt holders) under two alternative financial plans. The total earnings are more by Rs 18,750 under the debt-equity plan that is exactly the amount of tax saved (i.e. Rs 60,000 – Rs 41,250), on account of the tax deductibility of the interest charges. The **interest tax shield** under the second financial plan could be directly found out as:

$$\text{Interest tax shield} = \text{Tax rate} \times \text{Interest}$$
$$= 0.5 \times 37{,}500 = \text{Rs}\,18{,}750$$

It is the fact of the tax deductibility of the interest charges, which makes the use of the debt in the capital structure beneficial to a firm.

NOTES

Instead of following the long procedure discussed in Table 7.2, Equation 5 or 7 can be used to examine the effect of the alternative financial plans on the shareholders' return. Suppose that the management of the firm in the example is considering a third alternative. They want to use 75 per cent debt and 25 per cent equity to finance the assets. Under this financial plan, for raising equity investment of Rs 125,000, the firm will sell 12,500 shares and pay Rs 56,250 interest on a debt of Rs 375,000 at 15 per cent. EPS and ROE will be as follows:

$$\text{EPS} = \frac{(\text{EBIT} - \text{INT})(1-T)}{N}$$
$$= \frac{(120{,}000 - 56{,}250)(1-0.50)}{12{,}500} = \frac{31{,}875}{12{,}500} = \text{Rs}\,2.55$$
$$\text{ROE} = \frac{(\text{EBIT} - \text{INT})(1-T)}{E} = \frac{31{,}875}{125{,}000} = 25.5\%$$

Under the third alternative financial plan of 75 per cent debt, EPS and ROE are more than double as compared with all-equity, no-leverage financial plan.

In the example, we assume that the firm earns EBIT of 24 per cent on its investment (or Rs 500,000 × 0.24 = Rs 120,000). Since the firm pays 15 per cent on debt and earns more (24 per cent) on these funds, the effect of leverage is favourable. The more debt the firm uses, the greater is the EPS or ROE. The 24 per cent overall return is an *expected* figure. Suppose that, for some reason, the firm may not be able to earn 24 per cent before-tax return on its total capital, rather it can earn only 12 per cent return (i.e., EBIT = Rs 60,000). What would be the impact on EPS and ROE? We can use Equations 5 and 7 to calculate EPS and ROE:

No debt plan

$$\text{EPS} = \frac{(60{,}000 - 0)(1-0.5)}{50{,}000} = \frac{30{,}000}{50{,}000} = \text{Re}\,0.60$$
$$\text{ROE} = \frac{30{,}000}{500{,}000} = 6\%$$

50% debt plan

$$\text{EPS} = \frac{(60{,}000 - 37{,}500)(1-0.5)}{25{,}000} = \frac{11{,}250}{25{,}000} = \text{Re}\,0.45$$
$$\text{ROE} = \frac{11{,}250}{250{,}000} = 4.5\%$$

75% debt plan

$$\text{EPS} = \frac{(60{,}000 - 56{,}250)(1-0.5)}{12{,}500} = \frac{1{,}875}{12{,}500} = \text{Re}\,0.15$$
$$\text{ROE} = \frac{1{,}875}{125{,}000} = 1.5\%$$

We can see from the calculations above that the effect of financial leverage is unfavourable. EPS and ROE decline as more debt is used. Why is the effect of financial leverage unfavourable? It is unfavourable because the firm's rate of return on total funds or assets is less than the cost of debt. The firm is paying 15 per cent on debt and earning a return of 12 per cent on funds employed. The shareholders will have to meet the deficit of 3 per cent. As a result, EPS and ROE decline. If the rate of return on assets were just equal to the cost of debt, it can be seen that financial leverage will have no impact on the shareholders' return. EPS and ROE would be the same under all plans. We are thus led to an important conclusion: *The financial leverage will have a favourable impact on EPS and ROE only when the firm's return on investment (ROI)*

NOTES

exceeds the interest cost of debt (i). The impact will be unfavourable if the return on investment is less than the interest cost. It is in this sense that the financial leverage is said to be a double-edged sword.

Effect of Leverage on ROE and EPS

Favourable	$ROI > i$
Unfavourable	$ROI < i$
Neutral	$ROI = i$

These conclusions become very clear if we rewrite the formula for ROE. Suppose r is the before-tax return on assets or investment i.e. EBIT divided by $V = E + D$, and i is the interest rate on debt. Equation 7 can be written as follows:

$$\text{ROE} = \frac{(rV - iD)(1-T)}{E} = \frac{[r(E+D) - iD](1-T)}{E}$$

$$\text{ROE} = \left[r + (r-i)\frac{D}{E} \right](1-T) \tag{8}$$

For an all-equity capital structure firm, D/E will be zero. Therefore, ROE for such firm is simply the after-tax return on assets:

$$\text{ROE} = r(1-T) \tag{9}$$

A comparison of Equations (8) and (9) clearly shows that ROE is more by $[(r-i)\,D/E]\,(1-T)$ factor when the firm uses debt. It is also indicated that if the return on assets exceeds the interest rate ($r > i$), ROE will increase linearly with increase in the financial leverage (*viz.*, D/E). The effect of leverage will depend on both D/E and the spread between the rate of return on assets (r) and interest cost (i). If the return on assets equals the interest rate ($r = i$), no benefit of the financial leverage will be obtained; that is, $(r-i)\,D/E\,(1-T) = 0$. The leverage effect will be unfavourable when the return on assets is less than the interest rate (when $r < i$, then $(r-i)\,D/E\,(1-T)$, would become negative). Equation (8) also shows that for a given level of financial leverage with the interest rate and tax rate being constant, ROE will increase or decline with the increase or decline in the rates of return on assets. The following section illustrates the behaviour of EPS with varying EBIT.

7.5.4 Analysing Alternative Financial Plans: Varying EBIT

In the previous example, we assumed EBIT as constant. In practice, EBIT for any firm is subject to various influences. For example, because of the fluctuations in the economic conditions, sales of a firm change and as a result, EBIT also varies. In a given period, the actual EBIT of the firm may be more or less than the anticipated. It is therefore useful to analyse the impact of the financial leverage on EPS (and ROE) for possible fluctuations in EBIT (or r).

EBIT–EPS analysis Suppose that the Brightways Ltd. may face any of the four possible economic conditions: very poor, poor, normal and good. The firm may have a 5 per cent chance of performing very poorly and earning a negative 5 per cent return on its total assets [EBIT = (0.05) × Rs 500,000 = – Rs 25,000]. If the economic condition is neither very poor nor normal, the firm may be able to manage a return of 10 or 15 per cent. It may have 10 per cent chance of earning 10 per cent return (EBIT = Rs 50,000). Under normal economic conditions, the firm has a 35 per cent chance of earning 24 per cent return (EBIT = Rs 120,000) and a 30 per cent chance of earning 32 per cent return (EBIT = Rs 160,000). If the economic conditions are really favourable, the firm can earn as high as 60 per cent return (EBIT = Rs 300,000). But there is only 5 per cent possibility that the economic conditions will prove to be so good. Brightways' possible levels of sales and operating expenses with their probability of occurrence are given in Table 7.4.

The behaviour of EPS (and ROE) with fluctuating EBIT (or return on assets) under the alternative financial plans is analysed in Table 7.5. The summary of the effect of the increasing financial leverage on EPS with changing EBIT (see Tables 7.6 and 7.7) provides interesting insights.

NOTES

Table 7.4: Expected Sales, EBIT, ROI with Associated Probabilities ***(Rs '000)***

	Economic Conditions					
	Very poor	***Poor***		***Normal***		***Good***
Probability	0.05	0.10	0.15	0.35	0.30	0.05
Sales (Rs)	510	660	710	800	880	1,160
Costs:						
Variable (Rs)	255	330	355	400	440	580
Fixed (Rs)	280	280	280	280	280	280
Total Costs (Rs)	535	610	635	680	720	860
EBIT (Rs)	– 25	50	75	120	160	300
ROI (r)	– 5%	10%	15%	24%	32%	60%

Table 7.5: Impact of Financial Leverage: Varying EBIT (*Rs ' 000*)

	Economic Conditions					
	Very poor	***Poor***		***Normal***		***Good***
Plan I: No debt						
EBIT	– 25.00	50.00	75.00	120.00	160.00	300.00
Less: Interest	0.00	0.00	0.00	0.00	0.00	0.00
PBT	– 25.00	50.00	75.00	120.00	160.00	300.00
Less: Tax, 50%	– 12.50*	25.00	37.50	60.00	80.00	150.00
PAT	– 12.50	25.00	37.50	60.00	80.00	150.00
No. of shares ('000)	50.00	50.00	50.00	50.00	50.00	50.00
EPS (Rs)	– 0.25	0.50	0.75	1.20	1.60	3.00
ROE (%)	– 2.50	5.00	7.50	12.00	16.00	30.00
Plan II: 25% debt						
EBIT	– 25.00	50.00	75.00	120.00	160.00	300.00
Less: Interest	18.75	18.75	18.75	18.75	18.75	18.75
PBT	– 43.75	31.25	56.25	101.25	141.25	281.25
Less: Tax, 50%	– 21.88*	15.63	28.13	50.63	70.63	140.63
PAT	– 21.8 7	15.62	28.12	50.62	70.62	140.62
No. of shares ('000)	37.50	37.50	37.50	37.50	37.50	37.50
EPS (Rs)	– 0.58	0.42	0.75	1.35	1.88	3.75
ROE (%)	– 5.80	4.20	7.50	13.50	18.80	37.50
Plan III: 50% debt						
EBIT	– 25.00	50.00	75.00	120.00	160.00	300.00
Less: Interest	37.50	37.50	37.50	37.50	37.50	37.50
PBT	– 62.50	12.50	37.50	82.50	122.50	262.50
Less: Tax, 50%	– 31.25*	6.25	18.75	41.25	61.25	131.25
PAT	– 31.25	6.25	18.75	41.25	61.25	131.25
No. of shares ('000)	25.00	25.00	25.00	25.00	25.00	25.00
EPS (Rs)	– 1.25	0.25	0.75	1.65	2.45	5.25
ROE (%)	– 12.50	2.50	7.50	16.50	24.50	52.50
Plan IV: 75% debt						
EBIT	– 25.00	50.00	75.00	120.00	160.00	300.00
Less: Interest	56.25	56.25	56.25	56.25	56.25	56.25
PBT	– 81.25	– 6.25	18.75	63.75	103.75	243.75
Less: Tax, 60%	– 40.63*	– 3.13	9.38	31.88	51.88	121.88
PAT	– 40.62	– 3.12	9.37	31.87	51.87	121.87
No. of shares ('000)	12.50	12.50	12.50	12.50	12.50	12.50
EPS (Rs)	– 3.25	– 0.25	0.75	2.55	4.15	9.75
ROE (%)	– 32.50	– 2.50	7.50	25.50	41.50	97.50

* It is assumed that losses will be set off against other profits or tax credit will be available to the firm.

NOTES

Financial Plan I does not employ any leverage. As EBIT increases, EPS also increases. In fact, EPS increases with improved EBIT under all financial plans (Table 7.6). What is important to note is that as the financial leverage is increased, EPS is further magnified. Take the example of normal and good years. When EBIT increases from Rs 120,000 to Rs 160,000—an increase by 33 per cent, EPS under no financial leverage plan increases proportionately (i.e., by 33 per cent). But EPS increases faster under the high financial leverage plans; it increases by 40 per cent when debt is 25 per cent, by 48 per cent when debt is 50 per cent and by 63 per cent when debt is 75 per cent. Same conclusions can be drawn from Table 7.7 for the behaviour of ROE in relation to return on assets (*r*). It may be worth repeating that the favourable effect of the increasing financial leverage during normal and good years is on account of the fact that the rates of return on assets (investment) exceed the cost on debt.

Financial leverage works both ways. It accelerates EPS (and ROE) under favourable economic conditions, but depresses EPS (and ROE) when the goings is not good for the firm. It can be seen from Tables 7.6 and 7.7 that EPS or ROE is lower with debt in the capital structure in the poor years. With no leverage plan, if the firm's return on assets is positive, although low, the shareholders do obtain positive EPS or ROE. For example, when the firm's return (*r*) is 10 per cent, EPS under no leverage plan is Re 0.40 (or ROE is 4 per cent). But it becomes lower with more debt used, and even turns negative under very high leverage plan, such as Financial Plan IV. The unfavourable effect on EPS (and ROE) is more severe with more debt in the capital structure when EBIT (or *r*) is negative.

Table 7.6: Summary of the Behaviour of EPS with Fluctuating EBIT under Alternative Financial Plans

		Financial Plan			
Economic Conditions	***EBIT***	***No debt I EPS***	***25% debt II EPS***	***50% debt III EPS***	***75% debt IV EPS***
Very poor	– 25,000	– 0.25	– 0.58	– 1.25	– 3.25
Poor	50,000	0.50	0.42	0.25	– 0.25
	75,000	0.75	0.75	0.75	0.75
Normal	1,20,000	1.20	1.35	1.65	2.55
	1,60,000	1.60	1.88	2.45	4.15
Good	3,00,000	3.00	3.75	5.25	9.75

Table 7.7: Summary of the Behaviour of ROE with Fluctuating Return on Assets under Alternative Financial Plans

		Financial Plan			
Economic Conditions	***Return on assets***	***No debt I***	***25% debt II***	***50% debt III***	***75% debt IV***
Very poor	– 5%	– 2.5%	– 5.8%	– 12.5%	– 32.5%
Poor	10%	5.0%	4.2%	2.5%	– 2.5%
	15%	7.5%	7.5%	7.5%	7.5%
Normal	24%	12.0%	13.5%	16.5%	25.5%
	32%	16.0%	18.8%	24.5%	41.5%
Good	60%	30.0%	37.5%	52.5%	97.5%

The reason again lies in the relationship between the return on assets and the cost of debt. If the cost of debt were more than the return on assets, EPS (or ROE) would depress with more leverage. It is indicated from Table 7.6 or Table 7.7 that when the firm earns 15 per cent return on its assets, which is equal to the cost of debt, EPS (or ROE) is the same under all financial plans. Whatever the firm earns on the funds raised through debt is exactly paid to the suppliers of debt as interest charges.

Variability of EPS Yet another significant point to be noted from Table 7.6 is that the higher

the financial leverage, the wider the range over which EPS varies with fluctuating EBIT. For example, when no debt is used (Financial Plan I), EPS ranges between a negative Re 0.25 to a positive Rs 3.00—a range of Rs 3.25. Under Financial Plan II, where 25 per cent debt is introduced in the capital structure, EPS ranges from a negative Re 0.58 to a positive Rs 3.75—a range of Rs 4.33. The range of EPS increases to Rs 6.50 and Rs 13.00 when debt is respectively 50 per cent and 75 per cent. The range for ROE shows the similar behaviour (Table 7.7). Thus, for any given level of variability in EBIT (or *r*), the increased financial leverage increases the degree of variability in EPS (or ROE). The indiscriminate use of financial leverage without taking into account the uncertainty surrounding EBIT (or *r*) can lead a firm into financial difficulties. More about the risk of the financial leverage is explained in the next section.

EBIT–EPS chart One convenient and useful way of showing the relationship between EBIT and EPS for the alternative financial plans is to prepare the EBIT–EPS chart. The chart is easy to prepare since, for any given level of financial leverage, EPS is linearly related to EBIT.[10] As noted earlier, the formula for calculating EPS is:

$$\text{EPS} = \frac{(\text{EBIT} - \text{INT})(1-T)}{N} = \frac{(1-T)}{N}[\text{EBIT} - \text{INT}] \tag{10}$$

Equation (10) can also be written as follows:

$$\begin{aligned}\text{EPS} &= \frac{(1-T)}{N}\text{EBIT} - \frac{(1-T)}{N}\text{INT} \\ &= -\frac{(1-T)}{N}\text{INT} + \frac{(1-T)}{N}\text{EBIT}\end{aligned} \tag{11}$$

We assume that the level of debt, the cost of debt and the tax rate are constant. Therefore, in Equations (10) and (11), the terms $(1 - T)/N$ and INT (which is equal to interest rate times debt, iD) are constant; EPS will increase if EBIT increases and fall if EBIT declines.

Under the assumptions made, the first part of Equation (11) is a constant and can be represented by *a*. EBIT is a random variable since it can assume a value more or less than expected. The term $(1 - T)/N$ is also a constant and can be shown as *b*. Thus, the EPS formula can be rewritten as:

$$\text{EPS} = a + b \times \text{EBIT} \tag{12}$$

Equation (12) clearly indicates that EPS is a linear function of EBIT.

The EBIT–EPS analysis shown in Table 7.8 could be worked out with the help of Equation (12). As an illustration, we work out Equation (12) for Financial Plan IV: equity Rs 125,000, 15 per cent debt Rs 375,000, number of shares 12,500 and tax rate 50 per cent. The values of *a* and *b* ('000 eliminated) are:

$$a = -\frac{(1-T)}{N}\text{INT} = \frac{0.5}{12.5} \times 56.25 = -2.25$$

$$b = \frac{(1-T)}{N} = \frac{0.5}{12.5} = 0.04$$

EPS for various levels of EBIT will be as shown in Table 7.8.

Table 7.8: EPS Calculations for Financial Plan IV: EPS = a + b EBIT

(1 – T)/N	***EBIT***	=	***b EBIT***	+	***a***	=	***EPS = a + b × EBIT***
(0.04)	(– 25)	=	– 1.00	+	– 2.25	=	– 3.25
(0.04)	(50)	=	2.00	+	– 2.25	=	– 0.25
(0.04)	(75)	=	3.00	+	– 2.25	=	0.75
(0.04)	(120)	=	4.80	+	– 2.25	=	2.55
(0.04)	(160)	=	6.40	+	– 2.25	=	4.15
(0.04)	(300)	=	12.00	+	– 2.25	=	9.75

10. Bierman, *op. cit.*

NOTES

Because of the linear relation between EPS and EBIT, the EBIT–EPS chart can be drawn easily. We can use the following information of Financial Plans I and III in our example to draw EBIT– EPS chart in Figure 7.1.

	EPS	
EBIT (Rs '000)	***No debt***	***50% debt***
– 25,000	– 0.25	– 1.25
0	0.00	– 0.75
25,000	0.25	– 0.25
50,000	0.50	0.25
75,000	0.75	0.75
1,00,000	1.00	1.25
1,25,000	1.25	1.75
1,50,000	1.50	2.25
1,75,000	1.75	2.75
2,00,000	2.00	3.25

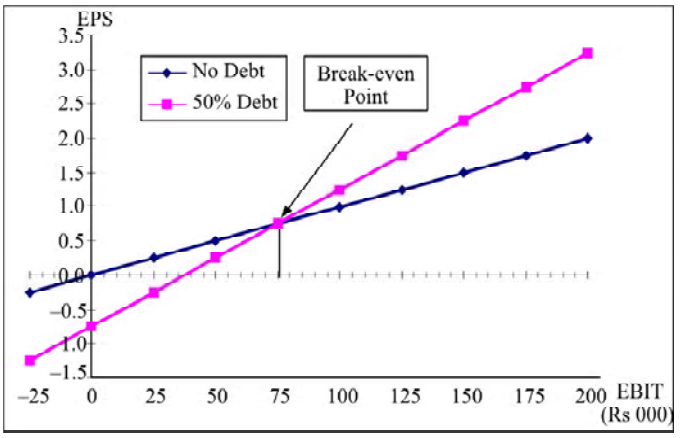


Figure 7.1: EBIT–EPS chart

In Figure 7.1 EBIT is shown on a horizontal line and EPS on a vertical line. If we identify any two points of EPS for two given levels of EBIT and join them in a straight line, we obtain EPS-line for a particular financial plan. For example, at EBIT of Rs 50,000 and Rs 75,000, two points of EPS are respectively Re 0.25 and Re 0.75 for Financial Plan III. If we join these two points in a straight line, we get EPS-line for Financial Plan III. The EPS-line can be similarly drawn for 100 per cent equity plan. We can see from Figure 7.2 that EPS-lines for all-equity and 50 per cent debt plans intersect at EBIT Rs 75,000. EPS under both plans are same at this level of EBIT. Figure 7.2, drawn similarly as Figure 7.1, shows four financial plans together.

The steep solid lines in Figure 7.2 show the relation between EBIT and EPS. The line relating EBIT and EPS becomes steeper with more debt in the capital structure, and steeper the line, the more the profit potential to the shareholders with increasing EBIT. If EBIT is declining, the loss to the shareholders will be magnified. The point of intersection of four EBIT–EPS lines in Figure 7.2 indicates the **indifference point** or the **EBIT-EPS break-even point** at which EPS is same regardless of the level of the financial leverage. In the example (see Table 7.6), EPS is same for all financial plans when the firm earns a 15% return on assets or EBIT of Rs 75,000.

The 15 per cent return on assets is just equal to the cost of debt. It can also be noticed from Figure 7.2 that below the 'indifference point' the EBIT–EPS lines shift more towards the right when the level of financial leverage increases, indicating unfavourable effect because of a low rate of return on assets than the interest cost. The EBIT–EPS line shifts more towards the left beyond the 'indifference point' when the level of the financial leverage increases. This indicates

a favourable effect of leverage because the return on assets exceeds the interest rate. We thus again reach the conclusion that the shareholders will benefit by the use of the financial leverage in terms of the increased EPS if return on assets is higher than the interest cost, and will have reduced EPS if return on assets is lower than the interest cost; the shareholders' earnings will not be affected by the level of leverage if return on assets is just equal to the interest cost.

		EPS		
EBIT	***No debt***	***25% debt***	***50% debt***	***75% debt***
– 25,000	– 0.25	– 0.583	– 1.25	– 3.25
0	0.00	– 0.250	– 0.75	– 2.25
25,000	0.25	0.083	– 0.25	– 1.25
50,000	0.50	0.417	0.25	– 0.25
75,000	0.75	0.750	0.75	0.75
1,00,000	1.00	1.083	1.25	1.75
1,25,000	1.25	1.417	1.75	2.75
1,50,000	1.50	1.750	2.25	3.75
1,75,000	1.75	2.083	2.75	4.75
2,00,000	2.00	2.417	3.25	5.75

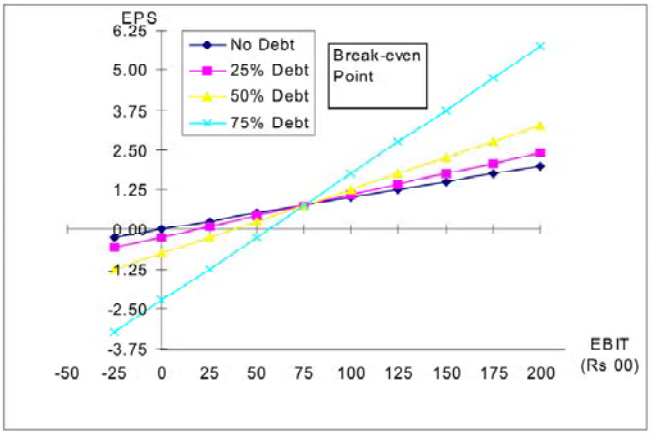


Figure 7.2: EBIT–EPS chart

Calculation of indifference point The break-even, or indifference, point between two alternative methods of financing can be determined by a formula. In the earlier example, suppose the firm is considering only two financial plans—an all-equity plan (Financial Plan I) and a 25 per cent debt and 75 per cent equity plan (Financial Plan II). The firm wants to know the level of EBIT at which EPS would be the same under both the plans. To find out the break-even level of EBIT, we may set the EPS formulae of two plans equal. The EPS formula under **all-equity plan** is

$$\text{EPS} = \frac{(1-T)\,\text{EBIT}}{N_1}$$

where N_1 is number of ordinary shares under first plan and since the firm has no debt, no interest charges exist. The EPS formula under **debt-equity plan** is*:*

$$\text{EPS} = \frac{(1-T)\,(\text{EBIT}-\text{INT})}{N_2}$$

where INT is the interest charges on debt and N_2 is the number of ordinary shares under second plan. Setting the two formulae equal, we have:

NOTES

$$\frac{(1-T)\,\text{EBIT}}{N_1} = \frac{(1-T)\,(\text{EBIT}-\text{INT})}{N_2} \tag{13}$$

Using the values for Financial Plans I and II given in the example, we can determine EBIT as follows:

$$\frac{(1-0.5)\text{EBIT}}{50{,}000} = \frac{(1-0.5)(\text{EBIT}-18{,}750)}{37{,}500}$$

$$0.5\ \text{EBIT}\frac{37{,}500}{50{,}000} = 0.5\ \text{EBIT} - 9{,}375$$

$$9{,}375 = 0.5\ \text{EBIT} - 0.375\ \text{EBIT}$$

$$\text{EBIT} = \frac{9{,}375}{0.125} = \text{Rs}\,75{,}000$$

We can simplify Equation (13) as follows:

$$\text{EBIT} = \frac{N_1}{N_1 - N_2} \times \text{INT} \tag{14}$$

Thus, in the example:

$$\text{EBIT} = \frac{50{,}000}{50{,}000 - 37{,}500} \times 18{,}750 = 4 \times 18{,}750 = \text{Rs}\,75{,}000$$

Sometimes a firm may like to make a choice between two levels of debt. Then, the indifference point formula will be:

$$\frac{(1-T)\,(\text{EBIT}-\text{INT}_1)}{N_1} = \frac{(1-T)\,(\text{EBIT}-\text{INT}_2)}{N_2} \tag{15}$$

where INT_1 and INT_2 represent the interest charges under the alternative financial plans. After simplifying Equation (15), we obtain:

$$\text{EBIT} = \frac{N_1 \times \text{INT}_2 - N_2 \times \text{INT}_1}{N_1 - N_2} \tag{16}$$

Many other combinations of the methods of financing may be compared. The firm may compare between an all-equity plan and an equity-and-preference share plan. Then the indifference point formula will be:

$$\frac{(1-T)(\text{EBIT})}{N_1} = \frac{(1-T)\text{EBIT} - \text{PDIV}}{N_2} \tag{17}$$

Equation (17) can be simplified as follows:

$$\text{EBIT} = \frac{N_1}{N_1 - N_2} \times \frac{\text{PDIV}}{1-T} \tag{18}$$

Illustration 7.1: Calculation of Indifferent Points

Calculate the level of EBIT at which the indifference point between the following financing alternatives will occur:

(*i*) Ordinary share capital Rs 10 lakh or 15% debentures of Rs 5 lakh and ordinary share capital of Rs 5 lakh.

(*ii*) Ordinary share capital of Rs 10 lakh or 13% preference share capital of Rs 5 lakh and ordinary share capital of Rs 5 lakh.

(*iii*) Ordinary share capital of Rs 10 lakh or ordinary share capital of Rs 5 lakh, 13% preference share capital of Rs 2 lakh and 15% debenture of Rs 3 lakh.

(*iv*) Ordinary share capital of Rs 6 lakh and 15 debentures of Rs 4 lakh or ordinary share capital of Rs 4 lakh, 13% unit preference share capital of Rs 2 lakh and 15% debentures of Rs 4 lakh.

(*v*) Ordinary share capital of Rs 8 lakh and 13% preference share capital of Rs 2 lakh or ordinary share capital of Rs 4 lakh, 13% preference share capital of Rs 2 lakh and 15% debentures of Rs 4 lakh.

Assume that the corporate tax rate is 50 per cent and the price of the ordinary share is Rs 10 in each case.

The indifference points for the various combinations of the methods of finance are calculated as follows:

(*i*) Ordinary shares vs. ordinary shares and debentures:

$$\text{EBIT} = \frac{N_1}{N_1 - N_2} \times \text{INT}$$
$$= \frac{100{,}000}{100{,}000 - 50{,}000} \times 75{,}000 = \text{Rs}\,150{,}000$$

(*ii*) Ordinary shares vs. ordinary and preference shares:

$$\text{EBIT} = \frac{N_1}{N_1 - N_2} \times \frac{\text{PDIV}}{1 - T} = \frac{100{,}000}{100{,}000 - 50{,}000} \times \frac{65{,}000}{1 - 0.5}$$
$$= 2 \times 130{,}000 = \text{Rs}\ 260{,}000$$

(*iii*) Ordinary shares vs. ordinary and preference shares and debentures

$$\text{EBIT} = \frac{N_1}{N_1 - N_2} \times \left[\text{INT} + \frac{\text{PDIV}}{(1 - T)}\right]$$
$$= \frac{100{,}000}{100{,}000 - 50{,}000} \times \left[45{,}000 + \frac{26{,}000}{(1 - 0.5)}\right]$$
$$= 2 \times (45{,}000 + 52{,}000) = \text{Rs}\ 194{,}000$$

(*iv*) Ordinary shares and debentures vs. ordinary and preference shares and debentures:

$$\text{EBIT} = \frac{N_1}{N_1 - N_2} \times \left[\text{INT}_2 + \frac{\text{PDIV}}{(1 - T)}\right] - \left[\frac{N_2}{N_1 - N_2} \times \text{INT}_1\right]$$
$$= \frac{60{,}000}{60{,}000 - 40{,}000} \times \left[60{,}000 + \frac{26{,}000}{(1 - 0.5)}\right]$$
$$- \left[\frac{40{,}000}{60{,}000 - 40{,}000} \times 60{,}000\right]$$
$$= (3 \times 112{,}000) - (2 \times 60{,}000) = \text{Rs}\ 216{,}000$$

(*v*) Ordinary shares and preference shows vs. ordinary and preference shares and debentures:

$$\text{EBIT} = \frac{N_1}{N_1 - N_2} \times \left[\text{INT} + \frac{\text{PDIV}_2}{(1 - T)}\right] - \left[\frac{N_2}{N_1 - N_2} \times \frac{\text{PDIV}_1}{(1 - T)}\right]$$
$$= \frac{80{,}000}{80{,}000 - 40{,}000} \times \left(60{,}000 + \frac{26{,}000}{1 - 0.5}\right)$$
$$- \left(\frac{40{,}000}{80{,}000 - 40{,}000} \times \frac{26{,}000}{1 - 0.5}\right)$$
$$= 2 \times 112{,}000 - 1 \times 52{,}000 = \text{Rs}\,172{,}000$$

7.6 COMBINING FINANCIAL AND OPERATING LEVERAGES

Operating leverage affects a firm's operating profit (EBIT), while **financial leverage** affects profit after tax or the earnings per share. The combined effect of two leverages can be quite significant for the earnings available to ordinary shareholders.

NOTES

Check Your Progress

3. What impact does financial leverage have on EPS and ROE?
4. What is known as the indifference point in EBIT-EPS analysis?
5. Differentiate between degree of operating leverage (DOL) and degree of financial leverage (DFL).

NOTES

7.6.1 Degree of Operating Leverage

The **degree of operating leverage** (DOL) is defined as the percentage change in the earnings before interest and taxes relative to a given percentage change in sales. Thus:

$$\text{DOL} = \frac{\%\,\text{Change in EBIT}}{\%\,\text{Change in Sales}}$$

$$\text{DOL} = \frac{\Delta\,\text{EBIT/EBIT}}{\Delta\,\text{Sales/Sales}} \tag{19}$$

The following equation is also used for calculating DOL:

$$\text{DOL} = \frac{Q(s - v)}{Q(s - v) - F} \tag{20}$$

where Q is the units of output, s is the unit selling price, v is the unit variable cost and F is the total fixed costs. Equation (20) can also be written as follows:

$$\text{DOL} = \frac{\text{Contribution}}{\text{EBIT}} \tag{21}$$

Since contribution = EBIT + Fixed cost, Equation (21) can be expressed as follows:

$$\text{DOL} = \frac{\text{EBIT} + \text{Fixed Cost}}{\text{EBIT}} = 1 + \frac{F}{\text{EBIT}} \tag{22}$$

Suppose that in the earlier example of the Brightways Ltd. the management had developed the following income statement based on an expected sales volume of 100,000 units:

	Rs
Sales (100,000 units at Rs 8)	800,000
Less: Variable costs (100,000 at Rs 4)	400,000
Contribution	400,000
Less: Fixed costs	280,000
EBIT	120,000

Applying Equation (20), DOL is:

$$\text{DOL} = \frac{100{,}000\ (\text{Rs}\,8 - \text{Rs}\,4)}{100{,}000\ (\text{Rs}\,8 - \text{Rs}\,4) - \text{Rs}\ \ 280{,}000}$$

$$= \frac{\text{Rs}\ \ 400{,}000}{120{,}000} = 3.33$$

DOL of 3.33 implies that for a given change in Brightways' sales, EBIT will change by 3.33 times.

Let us suppose in the case of Brightways that a technical expert appointed by the management tells them that they can choose more automated production processes which will reduce unit variable cost to Rs 2 but will increase fixed costs to Rs 480,000. If the management accepts the expert's advice, then the income statement will look as follows:

	Rs
Sales (100,000 units at Rs 8)	800,000
Sales (100,000 at Rs 8)	800,000
Less: Variable costs (100,000 at Rs 2)	200,000
Contribution	600,000
Less: Fixed costs	480,000
EBIT	120,000

With high fixed costs and low variable costs, DOL for Brightways will be:

$$\text{DOL} = \frac{\text{Rs}\,600{,}000}{\text{Rs}\,120{,}000} = 5.0$$

If the Brightways Ltd. chooses high-automated technology and if its actual sales happen to be more than expected, its EBIT will increase greatly; an increase of 100 per cent in sales will lead to a 500 per cent increase in EBIT.

NOTES

7.6.2 Degree of Financial Leverage

We have seen earlier in this chapter that financial leverage affects the earnings per share. When the economic conditions are good and the firm's EBIT is increasing, its EPS increases faster with more debt in the capital structure. The **degree of financial leverage** (DFL) is defined as the percentage change in EPS due to a given percentage change in EBIT:

$$\text{DFL} = \frac{\%\,\text{Change in EPS}}{\%\,\text{Change in EBIT}}$$

or

$$\text{DFL} = \frac{\Delta\,\text{EPS/EPS}}{\Delta\,\text{EBIT/EBIT}} \tag{23}$$

In the case of the Brightways Ltd. when EBIT increases from Rs 120,000 to Rs 160,000, EPS increases from Rs 1.65 to Rs 2.45, when it employs 50 per cent debt and pays interest charges of Rs 37,500 (see Table 7.6). Applying Equation (23), DFL at EBIT of Rs 120,000 is:

$$\text{DFL} = \frac{(2.45 - 1.65)/1.65}{(160{,}000 - 120{,}000)/120{,}000} = \frac{0.485}{0.333} = 1.456$$

This implies that for a given change in EBIT, EPS will change by 1.456 times.

The following equation can also be used to calculate DFL:

$$\text{DFL} = \frac{\text{EBIT}}{\text{EBIT} - \text{INT}} = \frac{\text{EBIT}}{\text{PBT}} = 1 + \frac{\text{INT}}{\text{PBT}} \tag{24}$$

We know that EBIT = $Q\,(p - v) - F$ (and EBIT – INT = PBT). Thus Equation (24) can also be written as follows:

$$\text{DFL} = \frac{Q(s - v) - F}{Q(s - v) - F - \text{INT}} \tag{25}$$

The numerator of Equation (24) or (25) is earnings before interest and taxes and the denominator is profit before taxes.

In the example, the Brightways Ltd. was considering four alternative debt levels (see Table 7.5). Applying Equation (24), DFL for those alternatives at EBIT of Rs 120,000 is given below:

Table 7.9: Degree of Financial Leverage of Alternative Financial Plans at EBIT of Rs 120,000

Debt Level	***DFL***
0	1.000
25%	1.185
50%	1.456
75%	1.882

It is indicated from Table 7.9 that if the firm does not employ any debt, EPS will increase at the same rate at which EBIT increases. EPS increases faster for a given increase in EBIT when debt is introduced in the capital structure; more the debt in the capital structure, the greater the increase in EPS. The opposite will happen if EBIT declines—the greater will be the fall in EPS with more debt in the capital structure.

NOTES

7.6.3 Combined Effect of Operating and Financial Leverages

Operating and financial leverages together cause wide fluctuation in EPS for a given change in sales. If a company employs a high level of operating and financial leverage, even a small change in the level of sales will have dramatic effect on EPS. A company with cyclical sales will have a fluctuating EPS; but the swings in EPS will be more pronounced if the company also uses a high amount of operating and financial leverage.

The degrees of operating and financial leverages can be combined to see the effect of total leverage on EPS associated with a given change in sales. The **degree of combined leverage** (DCL) is given by the following equation:

$$= \frac{\%\text{ Changein EBIT}}{\%\text{ Changein sales}} \times \frac{\%\text{ Changein EPS}}{\%\text{ Changein EBIT}}$$
$$= \frac{\%\text{ Changein EPS}}{\%\text{ Changein Sales}} \quad (26)$$

Yet another way of expressing the degree of combined leverage is as follows:

$$\text{DCL} = \frac{Q(s-v)}{Q(s-v)-F} \times \frac{Q(s-v)-F}{Q(s-v)-F-\text{INT}}$$
$$= \frac{Q(s-v)}{Q(s-v)-F-\text{INT}} \quad (27)$$

Since $Q\,(s-v)$ is contribution and $Q\,(s-v)-F-\text{INT}$ is the profit after interest but before taxes, Equation (27) can also be written as follows:

$$\text{DCL} = \frac{\text{Contribution}}{\text{Profit before taxes}} = \frac{\text{EBIT} + \text{Fixed costs}}{\text{PBT}}$$
$$= \frac{\text{PBT} + \text{INT} + F}{\text{PBT}} = 1 + \frac{\text{INT} + F}{\text{PBT}} \quad (28)$$

For the Brightways Ltd. when it used less automated production processes, the combined leverage effect at a sales of Rs 8 lakh (100,000 units at Rs 8) and 50 per cent debt level is:

$$\text{DCL} = \frac{100{,}000(8-4)}{100{,}000(8-4) - 280{,}000 - 37{,}500}$$
$$= \frac{400{,}000}{82{,}500} = 4.85$$

In the case of the Brightways Ltd. combined effect of leverage is to increase EPS by 4.85 times for one unit increase in sales when it chooses less automated production process and employs 50 per cent debt. Thus, if the Brightways' sales increase by 10 per cent from Rs 8 lakh to Rs 8.80 lakh, then EPS will increase by: $10\% \times 4.85 = 48.5\%$. EPS at the sales level of Rs 8 lakh is Rs 1.65 then the new EPS will be:

$$\text{EPS} = 1.65 \times 1.485 = \text{Rs}\,2.45$$

The results tally with those worked out in Table 7.5.

Firms can employ operating and financial leverages in various combinations. The Brightways Ltd., for example, can either choose high-automated production processes and high degree of operating leverages or low automated production processes and low degree of operating leverage associated with high or low level of debt. The following are the possible combinations of operating and financial leverages for the Brightways Ltd.:

Table 7.10 indicates that the largest effect of leverage (9.41 times) will be obtained when the firm combines higher amount of operating leverage (5.00 times) with the highest level of debt (DFL = 1.882). If the company has this combination, EPS will increase by 9.41 times than the increase in sales. Thus, if Brightways sales increase from Rs 8 lakh to Rs 11.60 lakh—an increase of 45 per cent, EPS increases from Rs 2.55 to Rs 13.35—an increase by 423 per cent (i.e., 45 per cent × 9.41). Detailed calculations are given in Table 7.11.

NOTES

Table 7.10: Combinations of Operating and Financial Leverage for the Brightways Ltd.

Low Automation			*High Automation*		
DOL	***DFL***	***DCL***	***DOL***	***DFL***	***DCL***
3.33	1.000	3.33	5.00	1.000	5.00
3.33	1.185	3.95	5.00	1.185	5.93
3.33	1.455	4.85	5.00	1.456	7.28
3.33	1.882	6.27	5.00	1.882	9.41

Table 7.11: Brightways Ltd.: EPS Calculations for Change in Sales

Units sold	100,000	145,000
Sales (at Rs 8)	800,000	1,160,000
Less: Variable costs (at Rs 2)	200,000	290,000
Contribution	600,000	870,000
Less: Fixed costs	480,000	480,000
EBIT	120,000	390,000
Less: Interest	56,250	56,250
PBT	63,750	333,750
Less: Taxes (50%)	31,875	166,875
PAT	31,875	166,875
No. of shares	12,500	12,500
EPS	2.55	13.35
% Change in sales:	$\frac{1,160,000 - 800,000}{800,000} = 45\%$	
% Change in EPS:	$\frac{13.35 - 2.55}{2.55} = 423\%$	

This combination can, however, prove risky for the company. If sales decline, the adverse effect on EPS will be very severe. The right combination of operating and financial leverages will differ among companies. It would generally be governed by the behaviour of sales. Public utilities such as electricity companies can afford to combine high operating leverage with high financial leverage since they generally have stable or rising sales. A company whose sales fluctuate widely and erratically should avoid use of high leverage since it will be exposed to a very high degree of risk.

7.7 LET US SUMMARIZE

- The debt-equity mix of a firm is called its capital structure. The term financial structure, on the other hand, is used in a broader sense, and it includes equity and all liabilities of the firm.
- The capital structure decision is a significant financial decision since it affects the shareholders' return and risk, and consequently, **the market value of shares.**
- The use of the fixed-charges capital like debt with equity capital in the capital structure is described as financial leverage or trading on equity. The main reason for using financial leverage is to increase the shareholders' return. Consider an example.
- Suppose you have an opportunity of earning 20 per cent on an investment of Rs 100 for one year. If you invest your own money, your return will be 20 per cent. On the other hand, you

can borrow, say, Rs 50 at 10 per cent rate of interest from your friend and put your own money worth Rs 50. You shall get total earnings of Rs 20, out of which you will have to pay Rs 5 as interest to your friend. You shall be left with Rs 15 on your investment of Rs 50, which gives you a return of 30 per cent. You have earned more at the cost of your friend.

NOTES

- A firm determines the advantage of financial leverage by calculating its impact on earnings per share (EPS) or return on equity (ROE). For a 100 per cent equity-financed company, EPS is calculated as follows:

$$\text{EPS} = \frac{\text{EBIT}(1-T)}{N}$$

- For a company that employs both debt and equity EPS is given by the following formula:

$$\text{EPS} = \frac{(\text{EBIT} - \text{INT})(1-T)}{N}$$

  where EBIT is earnings before interest and taxes, INT is interest charge which is given by the product of interest rate *i* and the amount of debt (*D), T* is corporate tax rate and *N* is number of shares.

- If the firm's overall profitability is more than interest rate, EPS increases with debt. With increasing EBIT, EPS increases faster with more debt.

- The percentage change in EPS occurring due to a given percentage change in EBIT is referred to as the degree of financial leverage (DFL):

$$\text{DFL} = \frac{\%\ \text{Change in EPS}}{\%\ \text{Change in EBIT}} = \frac{\Delta\ \text{EPS/EPS}}{\Delta\ \text{EBIT/EBIT}}$$

- An alternative formula to calculate the degree of financial leverage is as follows:

$$\text{DFL} = \frac{\text{EBIT}}{\text{EBIT} - \text{INT}} = \frac{\text{EBIT}}{\text{PBT}} = 1 + \frac{\text{INT}}{\text{PBT}}$$

- EBIT depends on sales. A change in sales will affect EBIT. The variability in EBIT due to a change in sales is affected by the composition of fixed and variable costs.

- The percentage change in EBIT occurring due to a given percentage change in sales is referred to as the degree of operating leverage (DOL):

$$\text{DOL} = \frac{\%\ \text{Change in EBIT}}{\%\ \text{Change in Sales}} = \frac{\Delta\ \text{EBIT/EBIT}}{\Delta\ \text{Sales/Sales}}$$

- An alternative formula for calculating DOL is as follows:

$$\text{DOL} = \frac{\text{Contribution}}{\text{EBIT}} = 1 + \frac{\text{Fixed Cost}}{\text{EBIT}}$$

- DOL and DFL can be combined to see the effect of total leverage on EPS. The degree of combined leverage (DCL) is given as follows:

$$\text{DOL} = \text{DOL} \times \text{DFL} = \frac{\%\ \text{Change in EPS}}{\%\ \text{Change in sales}}$$

$$\text{DCL} = \frac{\text{Contribution}}{\text{EBIT} - \text{INT}} = \frac{\text{Contribution}}{\text{PBT}} = 1 + \frac{\text{INT} + F}{\text{PBT}}$$

7.8 KEY CONCEPTS

Break-even EBIT	Financial leverage	Operating leverage
Capital gearing	Financial risk	Operative risk
Capital structure	Financial structure	Risk-return trade off
Coefficient of variation	Gearing	Standard deviation
Combined leverage	Income gearing	Trading on equity
Coverage ratio	Indifference point	Variance
EBIT–EPS analysis	Insolvency	
EBIT–EPS chart	Interest tax shield	

7.9 ILLUSTRATIVE SOLVED PROBLEMS

Problem 7.1: *AB* Ltd. needs Rs 10 lakh (one million) for expansion. The expansion is expected to yield an annual EBIT of Rs 160,000. In choosing a financial plan, *AB* Ltd. has an objective of maximising earnings per share. It is considering the possibility of issuing equity shares and raising debt of Rs 100,000, or Rs 400,000 or Rs 600,000. The current market price per share is Rs 25 and is expected to drop to Rs 20 if the funds are borrowed in excess of Rs 500,000. Funds can be borrowed at the rates indicated below: (*a*) up to Rs 100,000 at 8%; (*b*) over Rs 100,000 up to Rs 500,000 at 12%; (*c*) over Rs 500,000 at 18%.

Assume a tax rate of 50 per cent. Determine the EPS for the three financing alternatives.

Solution: The EPS is determined as follows:

	Alternatives		
	I ***(Rs 100,000 debt)*** ***Rs***	***II*** ***(Rs 400,000 debt)*** ***Rs***	***III*** ***(Rs 600,000 debt)*** ***Rs***
EBIT	160,000	160,000	160,000
Interest	8,000	44,000	74,000
PBT	152,000	116,000	86,000
Taxes at 50%	76,000	58,000	43,000
PAT	76,000	58,000	43,000
No. of shares	36,000	24,000	20,000
EPS	2.11	2.42	2.15

The second alternative maximises EPS; therefore, it is the best financial alternative in the present case.

The interest charges for alternatives II and III are calculated as follows:

Interest Calculation, Alternative II

Rs	***Rs***
100,000 @ 8%	8,000
300,000 @ 12%	36,000
Total	44,000

NOTES

Interest Calculation, Alternative III

Rs	*Rs*
100,000 @ 8%	8,000
400,000 @ 12%	48,000
100,000 @ 18%	18,000
Total	74,000

The number of shares are found out by dividing the amount to be raised through equity issue by the market price per share. The market price per share is Rs 25 in case of first two alternatives and Rs 20 in case of the last alternative.

Problem 7.2: A company needs Rs 500,000 for construction of a new plant. The following three financial plans are feasible: (*i*) The company may issue 50,000 ordinary shares at Rs 10 per share. (*ii*) The company may issue 25,000 ordinary shares at Rs 10 per share and 2,500 debentures of Rs 100 denominations bearing a 8 per cent rate of interest. (*iii*) The company may issue 25,000 ordinary shares at Rs 10 per share and 2,500 preference shares at Rs 100 per share bearing a 8 per cent rate of dividend.

If the company's earnings before interest and taxes are Rs 10,000, Rs 20,000 Rs 40,000, Rs 60,000 and Rs 100,000, what are the earnings per share under each of the three financial plans? Which alternative would you recommend and why? Determine the indifference points by formulae and graphically. Assume a corporate tax rate of 50 per cent.

Solution: The earnings per share under the three financial plans are calculated as follows:

First Alternative:

	Rs	*Rs*	*Rs*	*Rs*	*Rs*
EBIT	10,000	20,000	40,000	60,000	1,00,000
Interest	0	0	0	0	0
PBT	10,000	20,000	40,000	60,000	1,00,000
Taxes @ 50%	5,000	10,000	20,000	30,000	50,000
PAT	5,000	10,000	20,000	30,000	50,000
No. of shares	50,000	50,000	50,000	50,000	50,000
EPS	0.10	0.20	0.40	0.60	1.00

Second Alternative:

	Rs	*Rs*	*Rs*	*Rs*	*Rs*
EBIT	10,000	20,000	40,000	60,000	100,000
Interest	20,000	20,000	20,000	20,000	20,000
PBT	(10,000)	0	20,000	40,000	80,000
Taxes @ 50%	(5,000)*	0	10,000	20,000	40,000
PAT	(5,000)	0	10,000	20,000	40,000
No. of shares	25,000	25,000	25,000	25,000	25,000
EPS	(0.20)	0.00	0.40	0.80	1.60

* It is assumed that the company will be able to set-off losses against other profits. If the company has no profits from other operations, losses will be carried forward.

NOTES

Third Alternative:

	Rs	*Rs*	*Rs*	*Rs*	*Rs*
EBIT	10,000	20,000	40,000	60,000	100,000
Interest	0	0	0	0	0
PBT	10,000	20,000	40,000	60,000	100,000
Taxes @ 50%	5,000	10,000	20,000	30,000	50,000
PAT	5,000	10,000	20,000	30,000	50,000
Pref. Dividend	20,000	20,000	20,000	20,000	20,000
PAT for ordinary shareholders	(15,000)	(10,000)	0	10,000	30,000
No. of shares	25,000	25,000	25,000	25,000	25,000
EPS	(0.60)	(0.40)	0.00	0.40	1.20

The choice of the financial plan will depend on the state of economic conditions. If the company's sales are increasing, the earnings per share will be maximum under the second financial alternative. Under favourable conditions, debt financing gives more benefit than equity or preference financing. Debt capital is cheaper than preference capital because interest on debt is tax deductible while preference dividend is not.

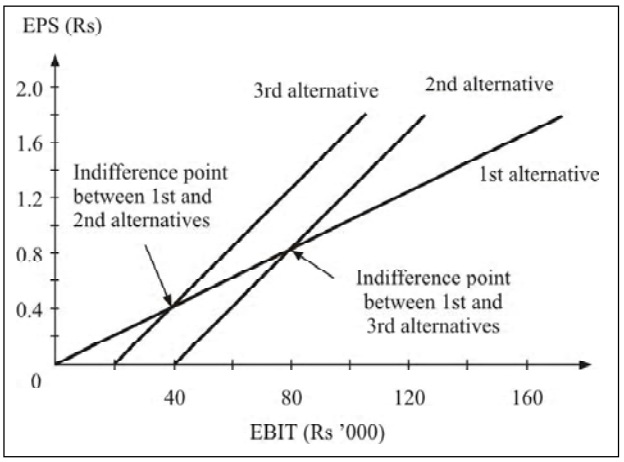


Figure 7.3: EBIT–EPS chart

The indifference points are determined by formula and graphically as follows:

(*i*)Indifference point between first and second alternatives:

$$\frac{(1-T)\text{EBIT}}{N_1} = \frac{(\text{EBIT}-\text{INT})(1-T)}{N_2}$$

$$\text{EBIT} = \frac{N_1}{N_1 - N_2} \times \text{INT} = \frac{50{,}000}{50{,}000 - 25{,}000} \times 20{,}000$$

$$\text{EBIT} = 2 \times 20{,}000 = \text{Rs}\,40{,}000$$

(*ii*)Indifference point between first and third alternatives:

$$\frac{(1-T)\text{EBIT}}{N_1} = \frac{(1-T)\text{EBIT} - \text{PDIV}}{N_2}$$

$$\text{EBIT} = \frac{N_1}{N_1 - N_2} \times \frac{\text{PDIV}}{1-T} = \frac{50{,}000}{50{,}000 - 25{,}000} \times \frac{20{,}000}{1-0.5}$$

$$\text{EBIT} = 2 \times 40{,}000 = \text{Rs}\ \ 80{,}000$$

NOTES

Problem 7.3: Two firms *A* and *B* have the following informa-tion:

	Sales (Rs in lakh)	*Variable Costs (Rs in lakh)*	*Fixed Costs (Rs in lakh)*
Firm *A*	1,800	450	900
Firm *B*	1,500	750	375

You are required to calculate (*a*) profit to sales ratio, (*b*) break-even point, and (*c*) the degree of operating leverage for both firms.

Comment on the positions of the firms. If sales increase by 20 per cent what shall be the impact on the profitability of the two firms?

Solution:

(*a*) (*i*) Contribution ratio: Contribution/Sales

$$\textit{Firm A:} \quad \frac{1{,}800 - 450}{1{,}800} = \frac{1{,}350}{1{,}800} = 0.75 \text{ or } 75\%$$

$$\textit{Firm B:} \quad \frac{1{,}500 - 750}{1{,}500} = \frac{750}{1{,}500} = 0.50 \text{ or } 50\%$$

(*ii*) Profit margin: Profit/Sales

$$\textit{Firm A:} \quad \frac{1{,}350 - 900}{1{,}800} = \frac{450}{1{,}800} = 0.25 \text{ or } 25\%$$

$$\textit{Firm B:} \quad \frac{750 - 375}{1{,}500} = \frac{370}{1{,}500} = 0.25 \text{ or } 25\%$$

(*b*) Break-even point

$$\textit{Firm A:} \quad \frac{900}{0.75} = \text{Rs } 1{,}200$$

$$\textit{Firm B:} \quad \frac{375}{0.50} = \text{Rs } 750$$

(*c*) Degree of operating leverage: Contribution/EBIT

$$\textit{Firm A:} \quad \frac{1{,}350}{450} = 3.0$$

$$\textit{Firm B:} \quad \frac{750}{375} = 2.0$$

Firm *A* has a higher contribution ratio as well as a higher operating leverage. Therefore, under favourable economic conditions, the firm's profit margin (EBIT/Sales ratio) will increase at a fast rate. Firm *B* has a lower contribution ratio but a lower break-even point and operating leverage as compared to Firm *A*. Its profits would grow relatively at a lower rate. At present, the profit margin for the two firms is same, but it would change with change in sales. If sales increase by 20 per cent, then profit margin would be as follows:

$$\text{Firm } A: \quad \frac{(1{,}800 \times 1.20)0.75 - 900}{1{,}800 \times 1.20} = \frac{720}{2{,}160} = 0.33 \text{ or } 33\%$$

$$\text{Firm } B: \quad \frac{(1{,}500 \times 1.20)0.50 - 375}{1{,}500 \times 1.20} = \frac{525}{1{,}800} = 0.29 \text{ or } 29\%$$

You may notice that 20 per cent increase in sales led to 60 per cent increase in profits (from Rs 450 lakh to Rs 720 lakh) for *A* and 40 per cent increase for *B* (for Rs 375 lakh to Rs 525 lakh). This has changed the profit margin for *A* higher than *B*.

Problem 7.4: Consider the following information for Kaunark Enterprise:

	Rs in lakh
EBIT	1,120
PBT	320
Fixed cost	700

Calculate percentage change in earnings per share if sales increased by 5 per cent.

Solution:

(*a*) Degree of operating leverage

$$DOL = \frac{\text{Contribution}}{\text{EBIT}} = \frac{\text{EBIT + Fixed Cost}}{\text{EBIT}}$$

$$= \frac{1,120 + 700}{1,120} = 1.625$$

(b) Degree of financial leverage

$$DFL = \frac{EBIT}{PBT} = \frac{1,120}{320} = 3.5$$

(c) Degree of combined leverage

$$DCL = DOL \times DFL = 1.625 \times 3.5 = 5.6875$$

DCL can also be found out as:

$$DCL = \frac{\%\text{ Change in EPS}}{\%\text{ Change in Sales}}$$

$$5.6875 = \frac{\%\text{ Change in EPS}}{5}$$

$$\%\text{ change in EPS} = 5 \times 5.6875 = 28.4375\%$$

Problem 7.5: Arun Chemicals Ltd. is considering expansion of its plant capacity to meet the growing demand. The company would finance the expansion either with 15 per cent debentures or issue of 10 lakh shares at a price of Rs 16 per share. The funds requirement is Rs 160 lakh. The company's profit and loss statement before expansion is as follows.

	Rs in lakh
Sales	1,500
Less: Costs	1,050
EBIT	450
Less: Interest	50
PBT	400
Less: Tax at 51.75%	207
PAT	193
Number of shares (lakh)	50
EPS (Rs)	3.86

The company's expected EBIT with associated probabilities after expansion is as follows:

EBIT (Rs in lakh)	***Probability***
250	0.10
450	0.30
540	0.50
600	0.10

NOTES

You are required to calculate the company's expected EBIT and EPS and standard deviation of EPS and EBIT for each plan.

Solution:

(*a*) $E(\text{EBIT}) = \text{EBIT}_1 \times P_1 + \text{EBIT}_2 \times P_2 + \text{EBIT}_3 \times P_3 + \cdots$

Plan I and II : $E(\text{EBIT}) = 250 \times 0.10 + 450 \times 0.30 + 540 \times 0.50 + 600 \times 0.10 = 490$

(*b*) $\sigma^2(\text{EBIT}) = [\text{EBIT}_1 - E(\text{EBIT})]^2 P_1 + [\text{EBIT}_2 - E(\text{EBIT})]^2 P_2 + [\text{EBIT}_3 - E(\text{EBIT})]^3 P_3 + \cdots$

$= (250 - 490)^2 \times 0.10 + (450 - 490)^2 \times 0.30 + (540 - 490)^2 \times 0.50 + (600 - 490)^2 \times 0.10$

$= 8,700$

$\sigma(\text{EBIT}) = \sqrt{8,700} = 93.27$

(*i*) Plan I: issue of 15% debenture

EBIT	250	450	540	630
Less: Interest*	74	74	74	74
PBT	176	376	466	556
Tax at 51.75%	91	195	241	288
PAT	85	181	225	268
No. of shares	50	50	50	50
EPS	1.70	3.62	4.50	5.36

* Includes existing and incremental interest.

$E(\text{EPS}) = 1.70 \times 0.10 + 3.62 \times 0.30 + 4.50 \times 0.50 + 5.36 \times 0.10$

$= 4.036$

$\sigma^2(\text{EPS}) = (1.70 - 4.036)^2 \times 0.10 + (3.62 - 4.036)^2 \times 0.30 + (4.50 - 4.036)^2 \times 0.50 + (5.36 - 4.036)^2 \times 0.10$

$= 0.8805$

$\sigma(\text{EPS}) = \sqrt{0.8805} = 0.94$

(*ii*) Plan (*ii*) : Issue of shares

EBIT	250	450	540	630
Less: Interest	50	50	50	50
PBT	200	400	490	580
Tax at 51.75%	104	207	254	300
PAT	96	193	236	280
No of shares*	60	60	60	60
EPS	1.60	3.22	3.93	4.67

* Includes existing and new shares.

$$E(\text{EPS}) = 1.60 \times 0.10 + 3.22 \times 0.30 + 3.93 \times 0.50 + 4.67 \times 0.10$$
$$= 3.558$$
$$\sigma^2(\text{EPS}) = (1.60 - 3.558)^2 \times 0.10 + (3.22 - 3.558)^2 \times 0.30$$
$$+ (3.93 - 3.558)^2 \times 0.50$$
$$+ (4.67 - 3.558)^2 \times 0.10$$
$$= 0.610496$$
$$\sigma(\text{EPS}) = \sqrt{0.610496} = 0.7813$$

Plan I (issue of debenture) has not only a higher expected EPS but also a higher standard deviation as well. The coefficient of variation is: 0.94/4.036 = 0.233 or 23.3%. The coefficient of variation of EPS under Plan II is: 0.7813/3.558 = 0.2196 or 21.96%. Thus Plan I has higher return as well as higher risk. The firm's overall risk is reflected by the variability of EBIT. The coefficient of variation of EBIT is: 93.27/490 = 0.1903 or 19.03%.

7.10 ANSWERS TO 'CHECK YOUR PROGRESS'

1. Firms use fixed charges sources of funds, such as debt and preference capital, along with the equity capital in the capital structure. This is known as financial leverage or gearing or trading on equity. The term trading on equity is used because the owner's equity is used as a basis to raise debt.
2. The most commonly used measures of financial leverage are debt ratio (ratio of debt to total capital), debt-equity ratio (ratio of debt to equity) and interest coverage (ratio of net operating income or EBIT to interest charges).
3. Financial leverage has a favourable impact on EPS and ROE only when the firm's return on investment (ROI) exceeds the interest cost of debt. However, the impact will be unfavourable if the return on investment is less than the interest cost.
4. The indifference point or the EBIT-EPS break-even point indicates the point at which the EPS is the same regardless of the level of financial leverage.
5. The degree of operating leverage (DOL) is defined as the percentage change in the earnings before interest and taxes (EBIT) relative to a given percentage change in sales. On the other hand, the degree of financial leverage (DFL) is defined as the percentage change in EPS due to a given percentage in EBIT. The combining effect of operating and financial leverages would result in percentage changes in EPS due to a given percentage change in Sales.

7.11 QUESTIONS AND EXERCISES

Review Questions

1. Explain the concept of financial leverage. Show the impact of financial leverage on the earnings per share.
2. Does financial leverage always increase the earnings per share? Illustrate your answer.
3. What is financial risk? How does differ from business risk? How does the use of financial leverage result in increased financial risk?
4. If the use of financial leverage magnifies the earnings per share under favourable economic conditions, why do companies not employ very large amount of debt in their capital structures?
5. What is an EBIT–EPS analysis? Illustrate your answer.
6. What is an indifference point in the EBIT–EPS analysis? How would you compute it?

NOTES

7. Explain the merits and demerits of the various measures of financial leverage.
8. Define operating and financial leverage. How can you measure the degree of operating and financial leverage? Illustrate with an example.
9. What is the degree of combined leverage? What do you think is the appropriate combination of operating and financial leverage?

Exercises

1. A company has assets of Rs 1,000,000 financed wholly by equity share capital. There are 100,000 shares outstanding with a book value of Rs 10 per share. Last year's profit before taxes was Rs 250,000. The tax rate is 35 per cent. The company is thinking of an expansion programme that will cost Rs 500,000. The financial manager considers the three financing plans: (*i*) selling 50,000 shares at Rs 10 per share, (*ii*) borrowing Rs 500,000 at an interest rate of 14 per cent, or (*iii*) selling Rs 500,000 of preference shares with a dividend rate of 14 per cent. The profit before interest and tax are estimated to be Rs 375,000 after expansion.

   You are required to calculate: (*a*) the after-tax rate of return on assets, (*b*) the earnings per share, and (*c*) the rate of return on shareholders' equity for each of the three financing alternatives. Also, suggest which alternative should be accepted by the firm.

2. A company is considering to raise Rs 200,000 to finance modernisation of its plant. The following three financing alternatives are feasible: (*i*) The company may issue 20,000 shares at Rs 10 per share, (*ii*) The company may issue 10,000 shares at Rs 10 per share and 1,000 debentures of Rs 100 denomination bearing a 14 per cent rate of interest. (*iii*) The company may issue 5,000 shares at Rs 10 per share and 1,500 debentures of Rs 100 denominations bearing a 14 per cent rate of interest.

   If the company's profits before interest are (*a*) Rs 5,000, (*b*) Rs 12,000, (*c*) Rs 25,000, what are the respective earnings per share, rate of return on total capital and rates of return on total equity capital, for each of the three alternatives? Which alternative would you recommend and why? If the corporate tax rate is 35 per cent, what are your answers to the above questions? How do you explain the difference in your answers?

3. The Apex Limited is a newly incorporated company and wants to plan an appropriate capital structure. It can issue 15 per cent debt and 11 per cent preference capital and has a 35 per cent tax rate. The firm's initial requirement for funds is Rs 400 lakh and equity shares can be sold for a net price of Rs 25 per share. The possible capital structures are:

Alternatives	*Equity*	*Preference*	*Debentures*
1	100%	—	—
2	75%	—	25%
3	75%	25%	—
4	50%	20%	30%
5	50%	—	50%
6	30%	20%	50%

   (*i*) Construct an EBIT–EPS chart for the six alternatives over an EBIT range of Rs 10 lakh to Rs 80 lakh.

   (*ii*) Determine the indifference points for first and fourth alternatives and for fourth and sixth alternatives.

   (*iii*) Is the maximisation of EPS at a specific level of EBIT the only function of a firm's capital structure? If not, are the points determined in (*ii*) truly 'indifference' points?

4. Empire Ltd. needs Rs 1,000,000 to build a new factory which will yield EBIT of Rs 150,000 per year. The company has to choose between two alternative financing plans: 75 per cent equity and 25 per cent debt or 50 per cent equity and 50 per cent debt. Under the first plan shares can be sold at Rs 50 per share, and the interest rate on debt will be 14 per cent. Under

the second plan shares can be sold for Rs 40 per share and the interest rate on debt will be 16 per cent. Determine the EPS for each plan assuming a 35 per cent tax rate.

5. Howard Company is considering three financing plans: all equity; 60 per cent equity and 40 per cent debt; and 40 per cent equity and 60 per cent debt. Total funds needed are Rs 300,000. EBIT is expected to be Rs 45,000. Shares can be sold at the rate of Rs 20 per cent share. Funds can be borrowed as follows: up to and including Rs 60,000 at 14 per cent; Rs 60,000 to Rs 150,000 at 16 per cent and over Rs 150,000 at 18 per cent. Compute the EPS of each plan. Assume a tax rate of 35 per cent.

6. *XYZ* Ltd. wishes to raise Rs 1,000,000 to finance the acquisition of new assets. It is considering three alternative ways of financing assets: (*i*) to issue only equity shares at Rs 20 per share, (*ii*) to borrow Rs 500,000 at 14 per cent rate of interest and issue equity shares at Rs 20 per share for the balance or (*iii*) to borrow Rs 750,000 at 14 per cent rate of interest and issue equity shares at Rs 20 per share for the balance. The following are the estimates of the earnings from the assets with their probability distribution:

EBIT (Rs)	***Probabilities***
80,000	0.10
120,000	0.20
160,000	0.40
200,000	0.20
320,000	0.10

You are required to (*i*) calculate the earnings per share (*ii*) compute the indifference points, and (*iii*) determine the financial risk, for each of the three alternatives. Assume a tax rate of 35 per cent.

7. For *X* Ltd. the following data is available:

EBIT	Rs 200
Contribution	400
Interest	100

If the company's sales are expected to decline by 5 per cent, determine the percentage change in EPS.

8. The expected earnings of firms *A* and *B* are Rs 120,000 with a standard deviation of Rs 30,000. Firm *A* is non-levered. Firm *B* is levered and has to pay annual interest charges of Rs 30,000. Which firm is more risky? Why?

9. Rastogi Ltd. is considering two plans (*a*) 15% debt or (*b*) issue of 100,000 shares of Rs 10 each to finance a proposed expansion at a cost of Rs 1,000,000. The company expects EBIT with associated probabilities as follows:

EBIT (Rs)	***Probabilities***
100,000	0.05
150,000	0.10
200,000	0.30
250,000	0.40
300,000	0.10
400,000	0.05

Determine the expected EBIT and coefficient of variation of EBIT. Also calculate expected EPS and its variability under two plans. Comment on your results. The company has 100,000 shares outstanding, and the corporate tax rate is 35 per cent.

10. A large chemical company is considering acquiring two small companies. The following is the financial data about two companies:

NOTES

(**Rs in lakh**)

	Company 1	*Company 2*
Sales	108.65	108.65
Less: Variable cost	43.46	35.85
Contribution	65.19	72.80
Less: Fixed cost	52.69	61.40
EBIT	12.50	11.40
Less: Interest	9.27	6.95
PBT	3.23	4.45
Less: Tax (35%)	1.13	1.56
PAT	2.10	2.89
Total assets	92.70	92.70
Equity	30.90	46.35
Debt	61.80	46.35

What would be the effect on companies' profitability and risk if sales fluctuate by 10 per cent? If the chemical company intends to acquire a less risky firm, which one should it buy? Give reasons.

11. Indus Engineering Company has gross sales of Rs 137.5 crore and profit after tax of Rs 7.15 crore in the year 2004. The company is considering expanding its capacity by adding 30 per cent more to its existing fixed assets. Sales are likely to increase by Rs 55 crore. For the proposed expansion, PBIT to sales ratio is 18 per cent. The company has never borrowed in the past. The finance director has recommended that the company should raise 15 per cent interest bearing debt for financing the expansion. In his opinion, given 35 per cent corporate income tax rate, the effective cost of debt will be 9.75 per cent, and considering the current net worth (see balance sheet given below), debt-equity ratio will be only 0.22, which is quite low for an engineering firm. Indus is a highly capital intensive company; its fixed costs are 70 per cent of the total costs. It is notable that the performance of engineering industry is quite susceptible to economic changes. Should the company borrow? Give your analysis by making appropriate assumptions.

Balance Sheet as on 31 December 2004 (**Rs in crore**)

Share capital			
(4 crore shares at Rs 10)	40.0	Fixed assets	100.0
Reserve	95.0	Current assets:	
Net worth	135.0	Debtors	20.0
Current liabilities	35.5	Inventory	30.0
		Cash	20.5
	170.5		170.5

13. Volga is a large manufacturing and marketing company in the private sector. In 2004, the company had a gross sales of Rs 980.2 crore. The other financial data for the company are given below:

Some Financial Data for Volga, 2004

Items	*Rs in crore*
Net worth	152.31
Borrowing	165.47
EBIT	43.17
Interest	34.39
Fixed costs (excluding interest)	118.23

You are required to calculate (*a*) debt-equity ratio; (*b*) debt ratio; (*c*) interest coverage, (*d*) operating leverage, (*e*) financial leverage and (*f*) combined leverage. Interpret your results and comment on the Volga's debt policy.

UNIT 8 PRINCIPLES OF WORKING CAPITAL MANAGEMENT

NOTES

Structure

8.0 INTRODUCTION

So far we have discussed the management of fixed assets and long-term financing. In this part, issues relating to the management of current assets will be discussed. The management of current assets is similar to that of fixed assets in the sense that in both cases a firm analyses their effects on its return and risk. The management of fixed and current assets, however, differs in three important ways: *First*, in managing fixed assets, time is a very important factor; consequently, discounting and compounding techniques play a significant role in capital budgeting and a minor one in the management of current assets. *Second*, the large holding of current assets, especially cash, strengthens the firm's liquidity position (and reduces riskiness), but also reduces the overall profitability. Thus, a risk-return trade off is involved in holding current assets. *Third*, levels of fixed as well as current assets depend upon *expected sales*, but it is only current assets which can be adjusted with sales fluctuations in the short run. Thus, the firm has a greater degree of flexibility in managing current assets. The two main sources of working capital are trade credit and bank borrowing. Commercial paper is another important source of short-term funds.

NOTES

8.1 UNIT OBJECTIVES

- Underline the need for investing in current assets, and elaborate the concept of operating cycle
- Highlight the necessity of managing current assets and current liabilities
- Explain the prinicples of current asset investment and financing
- Focus on the proper mix of short-term and long-term financing for current assets
- Discuss major sources of working capital funds including trade credit, bank finance and commercial paper.

8.2 CONCEPTS OF WORKING CAPITAL

There are two concepts of working capital—gross and net.

- ***Gross working capital*** refers to the firm's investment in current assets. **Current assets** are the assets which can be converted into cash within an accounting year and include cash, short-term securities, debtors, (accounts receivable or book debts) bills receivable and stock (inventory).
- ***Net working capital*** refers to the difference between current assets and current liabilities. **Current liabilities** are those claims of outsiders which are expected to mature for payment within an accounting year and include creditors (accounts payable), bills payable, and outstanding expenses. Net working capital can be positive or negative. A positive net working capital will arise when current assets exceed current liabilities. A negative net working capital occurs when current liabilities are in excess of current assets.

The two concepts of working capital—gross and net—are not exclusive; rather, they have equal significance from the management viewpoint.

8.2.1 Focusing on Management of Current Assets

The gross working capital concept focuses attention on two aspects of current assets management: (1) How to optimise investment in current assets? (2) How should current assets be financed?

The consideration of the level of investment in current assets should avoid two danger points—*excessive* or *inadequate* investment in current assets. Investment in current assets should be just adequate to the needs of the business firm. Excessive investment in current assets should be avoided because it impairs the firm's profitability, as idle investment earns nothing. On the other hand, inadequate amount of working capital can threaten solvency of the firm because of its inability to meet its current obligations. It should be realised that the working capital needs of the firm may be fluctuating with changing business activity. This may cause excess or shortage of working capital frequently. The management should be prompt to initiate an action and correct imbalances.

Another aspect of the gross working capital points to the need of arranging funds to finance current assets. Whenever a need for working capital funds arises due to the increasing level of business activity or for any other reason, financing arrangement should be made quickly. Similarly, if suddenly, some surplus funds arise they should not be allowed to remain idle, but should be invested in short-term securities. Thus, the financial manager should have knowledge of the sources of working capital funds as well as investment avenues where idle funds may be temporarily invested.

8.2.2 Focusing on Liquidity Management

Net working capital is a qualitative concept. It indicates the liquidity position of the firm and suggests the extent to which working capital needs may be financed by permanent sources of funds. Current assets should be sufficiently in excess of current liabilities to constitute a margin or buffer for maturing obligations within the ordinary operating cycle of a business. In order to protect their interests, short-term creditors always like a company to maintain current assets at a higher level than current liabilities. It is a conventional rule to maintain the level of current assets twice the level of current liabilities. However, the quality of current assets should be considered

in determining the level of current assets *vis-à-vis* current liabilities. A weak liquidity position poses a threat to the solvency of the company and makes it unsafe and unsound. A negative working capital means a negative liquidity, and may prove to be harmful for the company's reputation. Excessive liquidity is also bad. It may be due to mismanagement of current assets. Therefore, prompt and timely action should be taken by management to improve and correct the imbalances in the liquidity position of the firm.

Net working capital concept also covers the question of judicious mix of long-term and short-term funds for financing current assets. For every firm, there is a minimum amount of net working capital which is permanent. Therefore, a portion of the working capital should be financed with the permanent sources of funds such as equity share capital, debentures, long-term debt, preference share capital or retained earnings. Management must, therefore, decide the extent to which current assets should be financed with equity capital and/or borrowed capital.

In summary, it may be emphasised that both gross and net concepts of working capital are equally important for the efficient management of working capital. There is no precise way to determine the exact amount of gross, or net working capital for any firm. The data and problems of each company should be analysed to determine the amount of working capital. There is no specific rule as to how current assets should be financed. It is not feasible in practice to finance current assets by short-term sources only. Keeping in view the constraints of the individual company, a judicious mix of long and short-term finances should be invested in current assets. Since current assets involve cost of funds, they should be put to productive use.

8.3 OPERATING AND CASH CONVERSION CYCLE

The need for working capital to run the day-to-day business activities cannot be overemphasised. We will hardly find a business firm which does not require any amount of working capital. Indeed, firms differ in their requirements of the working capital.

We know that a firm should aim at maximising the wealth of its shareholders. In its endeavour to do so, a firm should earn sufficient return from its operations. Earning a steady amount of profit requires successful sales activity. The firm has to invest enough funds in current assets for generating sales. Current assets are needed because sales do not convert into cash instantan-eously. There is always an **operating cycle** involved in the conversion of sales into cash.

There is a difference between current and fixed assets in terms of their liquidity. A firm requires many years to recover the initial investment in fixed assets such as plant and machinery or land and buildings. On the contrary, investment in current assets is turned over many times in a year. Investment in current assets such as inventories and debtors (accounts receivable) is realised during the firm's operating cycle that is usually less than a year.[1] What is an operating cycle?

Operating cycle is the time duration required to convert sales, after the conversion of resources into inventories, into cash. The operating cycle of a manufacturing company involves three phases:

- ***Acquisition of resources*** such as raw material, labour, power and fuel etc.
- ***Manufacture of the product*** which includes conversion of raw material into work-in-progress into finished goods.
- ***Sale of the product*** either for cash or on credit. Credit sales create account receivable for collection.

These phases affect cash flows, which most of the time, are neither synchronised nor certain. They are not synchronised because cash outflows usually occur before cash inflows. Cash inflows are not certain because sales and collections which give rise to cash inflows are difficult to forecast accurately. Cash outflows, on the other hand, are relatively certain. The firm is, therefore, required to invest in current assets for a smooth, uninterrupted functioning. It needs to maintain liquidity to purchase raw materials and pay expenses such as wages and salaries, other manufacturing, administrative and selling expenses and taxes as there is hardly a matching between cash inflows and outflows. Cash is also held to meet any future exigencies. Stocks of raw material and work-in-process are kept to ensure smooth production and to guard against non-availability

1. Moyer, R.C. *et. al., Contemporary Finance Management,* West Publishing Co., 1984, p. 562.

NOTES

Check Your Progress

1. Differentiate between gross working and net working capital.
2. While deciding on the level of current assets, which are the risks that the management of the firm should avoid?
3. Why is the concept of net working capital important from a liquidity management perspective?
4. What is matching approach for financing of current assets?

NOTES

of raw material and other components. The firm holds stock of finished goods to meet the demands of customers on continuous basis and sudden demand from some customers. Debtors (accounts receivable) are created because goods are sold on credit for marketing and competitive reasons. Thus, a firm makes adequate investment in inventories, and debtors, for smooth, uninterrupted production and sale.

How is the length of operating cycle determined? Figure 8.1 illustrates this.[2] The length of the operating cycle of a manufacturing firm is the sum of: (*i*) **inventory conversion period** (ICP) and (*ii*) **debtors** (**receivable**) **conversion period** (DCP). The inventory conversion period is the total time needed for producing and selling the product. Typically, it includes: (*a*) **raw material conversion period** (RMCP), (*b*) **work-in-process conversion period** (WIPCP), and (*c*) **finished goods conversion period** (FGCP). The debtors conversion period is the time required to collect the outstanding amount from the customers. The total of inventory conversion period and debtors conversion period is referred to as **gross operating cycle** (GOC).

In practice, a firm may acquire resources (such as raw materials) on credit and temporarily postpone payment of certain expenses. Payables, which the firm can defer, are **spontaneous sources of capital** to finance investment in current assets. The **creditors** (**payables) deferral period** (CDP) is the length of time the firm is able to defer payments on various resource purchases. The difference between (gross) operating cycle and payables deferral period is **net operating cycle** (NOC). If

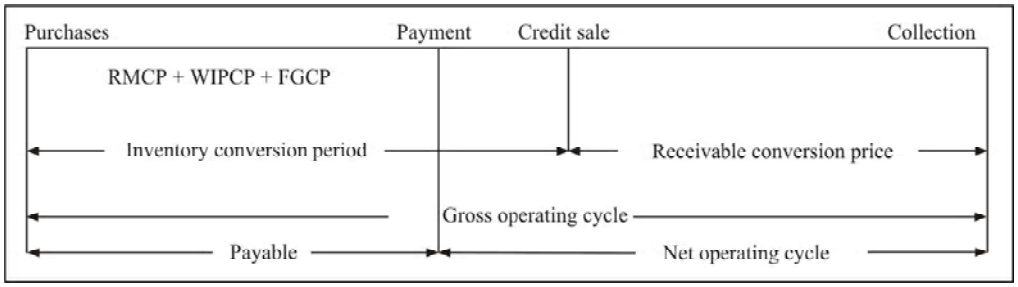


Figure 8.1 Operating cycle of a manufacturing firm

Table 8.1: Statement of Cost of Sales

(Rs in lakh)

Items	***Actual 19X1***	***Projected 19X2***
1. Purchase of raw material (credit)	4,653	6,091
2. Opening raw material inventory	523	827
3. Closing raw material inventory	827	986
4. Raw material consumed (1 + 2 – 3)	4,349	5,932
5. Direct labour	368	498
6. Depreciation	82	90
7. Other mfg. expenses	553	704
8. Total cost (4 + 5 + 6 + 7)	5,352	7,224
9. Opening work-in-process inventory	185	325
10. Closing work-in-process inventory	325	498
11. Cost of production (8 + 9 – 10)	5,212	7,051
12. Opening finished goods inventory	317	526
13. Closing finished goods inventory	526	995
14. Cost of goods sold (11 + 12 – 13)	5,003	6,582
15. Selling, administrative and general expenses	304	457
16. Cost of sales (14 + 15)	5,307	7,039

2. Richards, V.D. and Laughlin, E.J., A Cash-Conversion Cycle Approach to Liquidity Analysis, *Financial Management*, (Spring, 1980), pp. 32–38. Also see Moyer *et. al., op. cit.,* pp. 562–63.

depreciation is excluded from expenses in the computation of operating cycle, the net operating cycle also represents the **cash conversion cycle** (CCC). It is net time interval between cash collections from sale of the product and cash payments for resources acquired by the firm. It also represents the time interval over which additional funds, called working capital, should be obtained in order to carry out the firm's operations. The firm has to negotiate working capital from sources such as commercial banks. The negotiated sources of working capital financing are called **non-spontaneous sources**. If net operating cycle of a firm increases, it means further need for negotiated working capital.

Let us illustrate the computation of the length of operating cycle. Consider the statement of costs of sales for a firm given in Table 8.1.

The firm's data for sales and debtors and creditors are given in Table 8.2.

Table 8.2: Sales and Debtors

(Rs in lakh)

	19X1	***19X2***
Sales (credit)	6,087	8,006
Opening balance of debtors	545	735
Closing balance of debtors	735	1,040
Opening balance of creditors	300	454
Closing balance of creditors	454	642

8.3.1 Gross Operating Cycle (GOC)

The firm's gross operating cycle (GOC) can be determined as inventory conversion period (ICP) plus debtors conversion period (DCP). Thus, GOC is given as follows:

$$\text{Gross operating cycle} = \text{Inventory conversion period} + \text{Debtors conversion period}$$

$$\text{GOC} = \text{ICP} + \text{DCP} \tag{1}$$

Inventory conversion period What determines the inventory conversion period? The inventory conversion (ICP) is the sum of raw material conversion period (RMCP), work-in-process conversion period (WIPCP) and finished goods conversion period (FGCP):

$$\text{ICP} = \text{RMCP} + \text{WIPCP} + \text{FGCP} \tag{2}$$

- **Ram material conversion period** (**RMCP**) The raw material conversion period (RMCP) is the average time period taken to convert material in to work-in-process. RMCP depends on: (*a*) raw material consumption per day, and (*b*) raw material inventory. Raw material consumption per day is given by the total raw material consumption divided by the number of days in the year (say, 360). The raw material conversion period is obtained when raw material inventory is divided by raw material consumption per day. Similar calculations can be made for other inventories, debtors and creditors. The following formula can be used:

$$\text{Raw material period} = \frac{\text{Raw material inventory}}{[\text{Raw material consumption}]/360}$$

$$\text{RMCP} = \text{RMI} \div \frac{\text{RMC}}{360} = \frac{\text{RMI} \times 360}{\text{RMC}} \tag{3}$$

- **Work-in-process conversion period** (**WIPCP**): Work-in-process conversion period (WIPCP) is the average time taken to complete the semi-finished or work-in-process. It is given by the following formula:

$$\text{Work-in-process period} = \frac{\text{Work-in-process inventory}}{[\text{Cost of production}]/\ 360}$$

$$\text{WIPCP} = \text{WIPI} \div \frac{\text{COP}}{360} = \frac{\text{WIPI} \times 360}{\text{COP}} \tag{4}$$

- **Finished goods conversion period** (**FGCP**): Finished goods conversion period (FGCP) is the average time taken to sell the finished goods. FGCP can be calculated as follows:

NOTES

$$\text{Finished goods conversion period} = \frac{\text{Finished goods inventory}}{[\text{Cost of goods sold}]/\ 360}$$

$$\text{FGCP} = \text{FGI} \div \frac{\text{CGI}}{360} = \frac{\text{FGI} \times 360}{\text{CGS}} \quad (5)$$

Debtors (receivable) conversion period (DCP) Debtors conversion period (DCP) is the average time taken to convert debtors into cash. DCP represents the average collection period. It is calculated as follows:

$$\text{Debtors conversion period (DCP)} = \frac{\text{Debtors}}{\text{Credit sales}/\ 360} = \frac{\text{Debtors} \times 360}{\text{Credit sales}} \quad (6)$$

Creditors (payables) deferral period (CDP) Creditors (payables) deferral period (CDP) is the average time taken by the firm in paying its suppliers (creditors). CDP is given as follows:

$$\text{Creditors deferral period (CDP)} = \frac{\text{Creditors}}{\text{Credit purchases}/\ 360} = \frac{\text{Creditors} \times 360}{\text{Credit purchases}} \quad (7)$$

8.3.2 Cash Conversion or Net Operating Cycle

Net operating cycle (NOC) is the difference between gross operating cycle and payables deferral period.

$$\text{Net operating cycle} = \text{Gross operating cycle} - \text{Creditors deferral period}$$

$$\text{NOC} = \text{GOC} - \text{CDP} \quad (8)$$

Table 8.3: Operating Cycle Calculation *(Rs in lakh)*

Items	*Actual 19X1*	*Projected 19X2*
1. Raw Material Conversion Period		
(*a*) Raw material consumption	4,349	5,932
(*b*) Raw material consumption per day	12.1	16.5
(*c*) Raw material inventory	827	986
(*d*) Raw material inventory holding days	68d	60d
2. Work-in-Process Conversion Period		
(*a*) Cost of production*	5,212	7,051
(*b*) Cost of production per day	14.5	19.6
(*c*) Work-in-process inventory	325	498
(*d*) Work-in-process inventory holding days	22d	25d
3. Finished Goods Conversion Period		
(*a*) Cost of goods sold*	5,003	6,582
(*b*) Cost of goods sold per day	13.9	18.3
(*c*) Finished goods inventory	526	995
(*d*) Finished goods inventory holding days	38d	54d
4. Collection Period		
(*a*) Credit sales (at cost)**	6,087	8,006
(*b*) Sales per day	16.9	22.2
(*c*) Debtors	735	1,040
(*d*) Debtors outstanding days	43d	47d
5. Creditors Deferral Period		
(*a*) Credit purchases	4,653	6,091
(*b*) Purchase per day	12.9	16.9
(*c*) Creditors	454	642
(*d*) Creditors outstanding days	35d	38d

* Depreciation is included.

** All sales are assumed on credit.

Net operating cycle is also referred to as **cash conversion cycle**. Some people argue that depreciation and profit should be excluded in the computation of cash conversion cycle since the firm's

NOTES

concern is with cash flows associated with conversion *at cost*; depreciation is a non-cash item and profits are not costs. A contrary view is that a firm has to ultimately recover total costs and make profits; therefore, the calculation of operating cycle should include depreciation, and even the profits. Also, in using the above-mentioned formulae, average figures for the period may be used.

For our example, Table 8.3 shows detained calculations of the components of a firm's operating cycle. Table 8.4 provides the summary of calculations.

During 19X1 the daily raw material consumption was Rs 12.1 lakh and the company held an ending raw material inventory of Rs 827 lakh. If we assume that this is the average inventory held by the company, the raw material consumption period works out to be 68 days. You may notice that for 19X2, the projected raw material conversion period is 60 days. This has happened because both consumption (Rs 16.5 lakh per day) and level of inventory (Rs 986 lakh) have increased, but the consumption rate has increased (by 36.4 per cent) much more than the increase in inventory holding (by 19.2 per cent). Thus, the raw material conversion period has declined by 8 days. Raw material is the result of daily raw material consumption and total raw material consumption during a period given the company's production targets. Thus, raw material inventory is controlled through control over purchases and production. We can similarly interpret other calculations in Table 8.3.

Table 8.4: Summary of Operating Cycle Calculations (Number of Days)

	Actual		***Projected***	
GROSS OPERATING CYCLE				
1. Inventory Conversion Period				
(*i*) Raw material	68		60	
(*ii*) Work-in-process	22		25	
(*iii*) Finished goods	38	128	54	139
2. Debtors Conversion Period		43		47
3. Gross Operating Cycle (1 + 2)		171		186
4. Payment Deferral Period		35		38
NET OPERATING CYCLE (3 – 4)		136		148

We note a significant change in the company's policy for 19X2 with regard to finished goods inventory. It is expected to increase to 54 days holding from 38 days in the previous year. One reason could be a conscious policy decision to avoid stock-out situations and carry more finished goods inventory to expand sales. But this policy has a cost; the company, in the absence of a significant increase in payables (creditors) deferral period, will have to negotiate higher working capital funds. In the case of the firm in our example, its net operating cycle is expected to increase from 136 days to 148 days (Table 8.4). How does a company manage its inventories, debtors and suppliers' credit? How can it reduce its operating cycle? We shall attempt to answer these questions in the next four chapters.

The operating cycle concept as shown in Figure 8.1 relates to a manufacturing firm. Non-manufacturing firms such as wholesalers and retailers will not have the manufacturing phase. They will acquire stock of finished goods and convert them into debtors (receivable) and debtors into cash. Further, service and financial enterprises will not have inventory of goods (cash will be their inventory). Their operating cycles will be the shortest. They need to acquire cash, then lend (create debtors) and again convert lending into cash.

Check Your Progress

5. Define the operating cycle of a manufacturing firm.
6. What is meant by the term net operating cycle?
7. What are major components of gross operating cycle?
8. What is the manufacturing cycle period?

8.4 PERMANENT AND VARIABLE WORKING CAPITAL

We know that the need for current assets arises because of the operating cycle. The operating cycle is a continuous process and, therefore, the need for current assets is felt constantly. But the magnitude of current assets needed is not always the same; it increases and decreases over time.

NOTES

However, there is always a minimum level of current assets which is continuously required by a firm to carry on its business operations. **Permanent** or **fixed, working capital** is the minimum level of current assets. It is permanent in the same way as the firm's fixed assets are. Depending upon the changes in production and sales, the need for working capital, over and above permanent working capital, will fluctuate. For example, extra inventory of finished goods will have to be maintained to support the peak periods of sale, and investment in debtors (receivable) may also increase during such periods. On the other hand, investment in raw material, work-in-process and finished goods will fall if the market is slack.

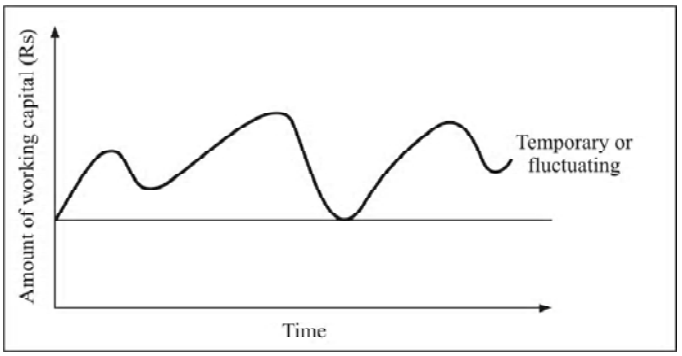


Figure 8.2 Permanent and temporary working capital

Fluctuating or **variable working capital** is the extra working capital needed to support the changing production and sales activities of the firm. Both kinds of working capital—permanent and fluctuating (temporary)—are necessary to facilitate production and sale through the operating cycle. But the firm to meet liquidity requirements that will last only temporarily creates the temporary working capital. Figure 8.2 illustrates differences between permanent and temporary working capital. It is shown that permanent working capital is stable over time, while temporary working capital is fluctuating—sometimes increasing and sometimes decreasing. However, the permanent working capital line need not be horizontal if the firm's requirement for permanent capital is increasing (or decreasing) over a period. For a growing firm, the difference between permanent and temporary working capital can be depicted through Figure 8.3.

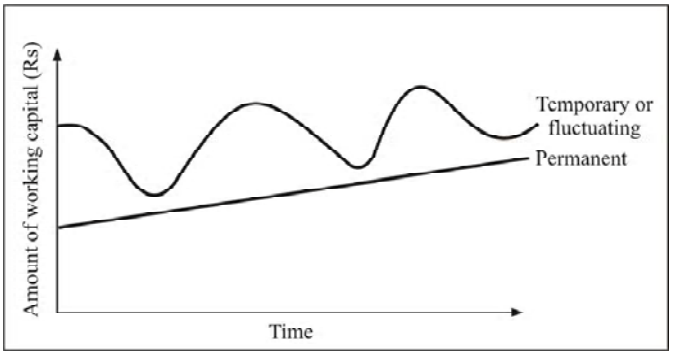


Figure 8.3 Permanent and temporary working capital

8.5 BALANCED WORKING CAPITAL POSITION

The firm should maintain a sound working capital position. It should have adequate working capital to run its business operations. Both excessive as well as inadequate working capital positions are dangerous from the firm's point of view. Excessive working capital means holding costs and idle funds which earn no profits for the firm. Paucity of working capital not only impairs the firm's profitability but also results in production interruptions and inefficiencies and sales disruptions.

Check Your Progress

9. Differentiate between permanent and variable working capital.

The dangers of excessive working capital are as follows:[3]

- It results in unnecessary accumulation of inventories. Thus, chances of inventory mishandling, waste, theft and losses increase.
- It is an indication of defective credit policy and slack collection period. Consequently, higher incidence of bad debts results, which adversely affects profits.
- Excessive working capital makes management complacent which degenerates into managerial inefficiency.
- Tendencies of accumulating inventories tend to make speculative profits grow. This may tend to make dividend policy liberal and difficult to cope with in future when the firm is unable to make speculative profits.

Inadequate working capital is also bad and has the following dangers:[4]

- It stagnates growth. It becomes difficult for the firm to undertake profitable projects for non-availability of working capital funds.
- It becomes difficult to implement operating plans and achieve the firm's profit target.
- Operating inefficiencies creep in when it becomes difficult even to meet day-to-day commitments.
- Fixed assets are not efficiently utilised for the lack of working capital funds. Thus, the firm's profitability would deteriorate.
- Paucity of working capital funds render the firm unable to avail attractive credit opportunities etc.
- The firm loses its reputation when it is not in a position to honour its short-term obligations. As a result, the firm faces tight credit terms.

An enlightened management should, therefore, maintain the right amount of working capital on a continuous basis. Only then a proper functioning of business operations will be ensured. Sound financial and statistical techniques, supported by judgement, should be used to predict the quantum of working capital needed at different time periods.

A firm's net working capital position is not only important as an index of liquidity but it is also used as a measure of the firm's risk. Risk in this regard means chances of the firm being unable to meet its obligations on due date. The lender considers a positive net working as a measure of safety. All other things being equal, the more the net working capital a firm has, the less likely that it will default in meeting its current financial obligations. Lenders such as commercial banks insist that the firm should maintain a minimum net working capital position.

8.6 DETERMINANTS OF WORKING CAPITAL

There are no set rules or formulae to determine the working capital requirements of firms. A large number of factors, each having a different importance, influence working capital needs of firms. The importance of factors also changes for a firm over time. Therefore, an analysis of relevant factors should be made in order to determine total investment in working capital. The following is the description of factors which generally influence the working capital requirements of firms.[5]

8.6.1 Nature of Business

Working capital requirements of a firm are basically influenced by the nature of its business. Trading and financial firms have a very small investment in fixed assets, but require a large sum of money to be invested in working capital. Retail stores, for example, must carry large stocks of a variety of goods to satisfy varied and continuous demands of their customers. A large departmental store like Wal-Mart may carry, say, over 20,000 items. Some manufacturing businesses, such as tobacco manufacturers and construction firms, also have to invest substantially in working

Check Your Progress

10. Why is it important to have a balanced working capital position?

3. Also see, Ramamoorthy, V.E., *Working Capital Management*, IFMR, Chennai, 1976, p. 11.
4. *Ibid*., p. 11.
5. *Ibid*., pp. 51–63.

NOTES

capital and a nominal amount in fixed assets. In contrast, public utilities may have limited need for working capital and have to invest abundantly in fixed assets. Their working capital requirements are nominal because they may have only cash sales and supply services, not products. Thus, no funds will be tied up in debtors and stock (inventories). For the working capital requirements most of the manufacturing companies will fall between the two extreme requirements of trading firms and public utilities. Such concerns have to make adequate investment in current assets depending upon the total assets structure and other variables.

8.6.2 Market and Demand Conditions

The working capital needs of a firm are related to its sales. However, it is difficult to precisely determine the relationship between volume of sales and working capital needs. In practice, current assets will have to be employed before growth takes place. It is, therefore, necessary to make advance planning of working capital for a growing firm on a continuous basis.

Growing firms may need to invest funds in fixed assets in order to sustain growing production and sales. This will, in turn, increase investment in current assets to support enlarged scale of operations. Growing firms need funds continuously. They use external sources as well as internal sources to meet increasing needs of funds. These firms face further problems when they retain substantial portion of profits, as they will not be able to pay dividends to shareholders. It is, therefore, imperative that such firms do proper planning to finance their increasing needs for working capital.

Sales depend on demand conditions. Large number of firms experience seasonal and cyclical fluctuations in the demand for their products and services. These business variations affect the working capital requirement, specially the temporary working capital requirement of the firm. When there is an upward swing in the economy, sales will increase; correspondingly, the firm's investment in inventories and debtors will also increase. Under boom, additional investment in fixed assets may be made by some firms to increase their productive capacity. This act of firms will require further additions of working capital. To meet their requirements of funds for fixed assets and current assets under boom period, firms generally resort to substantial borrowing. On the other hand, when there is a decline in the economy, sales will fall and consequently, levels of inventories and debtors will also fall. Under recession, firms try to reduce their short-term borrowings.

Seasonal fluctuations not only affect working capital requirement but also create production problems for the firm. During periods of peak demand, increasing production may be expensive for the firm. Similarly, it will be more expensive during slack periods when the firm has to sustain its working force and physical facilities without adequate production and sales. A firm may, thus, follow a policy of **level production**, irrespective of seasonal changes in order to utilise its resources to the fullest extent. Such a policy will mean accumulation of inventories during off-season and their quick disposal during the peak season.

The increasing level of inventories during the slack season will require increasing funds to be tied up in the working capital for some months. Unlike cyclical fluctuations, seasonal fluctuations generally conform to a steady pattern. Therefore, financial arrangements for seasonal working capital requirements can be made in advance. However, the financial plan or arrangement should be flexible enough to take care of some abrupt seasonal fluctuations.

8.6.3 Technology and Manufacturing Policy

The **manufacturing cycle** (or the inventory conversion cycle) comprises of the purchase and use of raw materials and the production of finished goods. Longer the manufacturing cycle, larger will be the firm's working capital requirements. For example, the manufacturing cycle in the case of a boiler, depending on its size, may range between six to twenty-four months. On the other hand, the manufacturing cycle of products such as detergent powder, soaps, chocolate etc. may be a few hours. An extended manufacturing time span means a larger tie-up of funds in inventories. Thus, if there are alternative technologies of manufacturing a product, the technological process

with the shortest manufacturing cycle may be chosen. Once a manufacturing technology has been selected, it should be ensured that manufacturing cycle is completed within the specified period. This needs proper planning and coordination at all levels of activity. Any delay in manufacturing process will result in accumulation of work-in-process and waste of time. In order to minimise their investment in working capital, some firms, specifically those manufacturing industrial products, have a policy of asking for advance payments from their customers. Non-manufacturing firms, service and financial enterprises do not have a manufacturing cycle.

A strategy of level or steady production may be maintained in order to resolve the working capital problems arising due to seasonal changes in the demand for the firm's product. A **steady** or **level production policy** will cause inventories to accumulate during the off-season periods and the firm will be exposed to greater inventory costs and risks. Thus, if costs and risks of maintaining a constant production schedule are high, the firm may adopt a **variable production policy**, varying its production schedules in accordance with changing demand. Those firms, whose productive capacities can be utilised for manufacturing varied products, can have the advantage of diversified activities and solve their working capital problems. They will manufacture the original product line during its increasing demand and when it has an off-season, other products may be manufactured to utilise physical resources and working force. Thus, production policies will differ from firm to firm, depending on the circumstances of individual firm.

8.6.4 Credit Policy

The credit policy of the firm affects the working capital by influencing the level of debtors. The credit terms to be granted to customers may depend upon the norms of the industry to which the firm belongs. But a firm has the flexibility of shaping its credit policy within the constraint of industry norms and practices. The firm should use discretion in granting credit terms to its customers. Depending upon the individual case, different terms may be given to different customers. A **liberal credit policy**, without rating the credit-worthiness of customers, will be detrimental to the firm and will create a problem of collection later on. The firm should be prompt in making collections. A high collection period will mean tie-up of large funds in debtors. Slack collection procedures can increase the chance of bad debts.

In order to ensure that unnecessary funds are not tied up in debtors, the firm should follow a rationalised credit policy based on the credit standing of customers and other relevant factors. The firm should evaluate the credit standing of new customers and periodically review the credit-worthiness of the existing customers. The case of delayed payments should be thoroughly investigated.

8.6.5 Availability of Credit from Suppliers

The working capital requirements of a firm are also affected by credit terms granted by its suppliers. A firm will needless working capital if liberal credit terms are available to it from suppliers. Suppliers' credit finances the firm's inventories and reduces the cash conversion cycle. In the absence of suppliers' credit the firm will have to borrow funds for bank. The availability of credit at reasonable cost from banks is crucial. It influences the working capital policy of a firm. A firm without the suppliers' credit, but which can get bank credit easily on favourable conditions, will be able to finance its inventories and debtors without much difficulty.

8.6.6 Operating Efficiency

The operating efficiency of the firm relates to the optimum utilisation of all its resources at minimum costs. The efficiency in controlling operating costs and utilising fixed and current assets leads to operating efficiency. The use of working capital is improved and pace of cash conversion cycle is accelerated with operating efficiency. Better utilisation of resources improves profitability and, thus, helps in releasing the pressure on working capital. Although it may not be possible for a firm to control prices of materials or wages of labour, it can certainly ensure efficient and effective use of its materials, labour and other resources.

NOTES

8.6.7 Price Level Changes

The increasing shifts in price level make functions of financial manager difficult. She should anticipate the effect of price level changes on working capital requirements of the firm. Generally, rising price levels will require a firm to maintain higher amount of working capital. Same levels of current assets will need increased investment when prices are increasing. However, companies that can immediately revise their product prices with rising price levels will not face a severe working capital problem. Further, firms will feel effects of increasing general price level differently as prices of individual products move differently. Thus, it is possible that some companies may not be affected by rising prices while others may be badly hit.

8.7 ISSUES IN WORKING CAPITAL MANAGEMENT

Working capital management refers to the administration of all components of working capital–cash, marketable securities, debtors (receivable) and stock (inventories) and creditors (payables). The financial manager must determine *levels* and *composition* of current assets. He must see that right sources are tapped to finance current assets, and that current liabilities are paid in time.

There are many aspects of working capital management which make it an important function of the financial manager:[6]

- ***Time*** Working capital management requires much of the financial manager's time.
- ***Investment*** Working capital represents a large portion of the total investment in assets.
- ***Criticality*** Working capital management has great significance for all firms but it is very critical for small firms.
- ***Growth*** The need for working capital is directly related to the firm's growth.

Empirical observations show that the financial managers have to spend much of their time to the daily internal operations, relating to current assets and current liabilities of the firms. As the largest portion of the financial manager's valuable time is devoted to working capital problems, it is necessary to manage working capital in the best possible way to get the maximum benefit.

Investment in current assets represents a very significant portion of the total investment in assets. For example, in the case of the large and medium public limited companies in India, current assets constitute about 60 per cent of total assets or total capital employed.[7] In a large company such as Bharat Heavy Electricals Limited (BHEL) current assets as a percentage of total assets may be as high as, say, 90 per cent. (See Exhibit 4.1 for examples of other companies). This clearly indicates that the financial manager should pay special attention to the management of current assets on a continuing basis. Actions should be taken to curtail unnecessary investment in current assets.

Working capital management is critical for all firms, but particularly for small firms. A small firm may not have much investment in fixed assets, but it has to invest in current assets. Small firms in India face a severe problem of collecting their debtors (book debts or receivables). Further, the role of current liabilities in financing current assets is far more significant in case of small firms, as, unlike large firms, they face difficulties in raising long-term finances.

There is a direct relationship between a firm's growth and its working capital needs. As sales grow, the firm needs to invest more in inventories and debtors. These needs become very frequent and fast when sales grow continuously. The financial manager should be aware of such needs and finance them quickly. Continuous growth in sales may also require additional investment in fixed assets.

It may, thus, be concluded that all precautions should be taken for the effective and efficient management of working capital. The finance manager should pay particular attention to the levels of current assets and the financing of current assets. To decide the levels and financing of current assets, the risk–return implications must be evaluated.

Check Your Progress

11. List some of the major determinants of working capital.
12. How does credit policy followed by the firm affect working capital requirements?
13. What are the various factors affecting the working capital requirement of any organization?

6. Weston, J. Fred and Eugene F. Brigham, *Managerial Finance*, Illinois: Dryden Press, 1975, pp. 123–24.
7. Reserve Bank of India, Finance of Medium and Large Public Limited Companies, various issues of *Reserve Bank of India Bulletin*.

EXHIBIT 8.1: LEVELS OF CURRENT ASSETS: SOME EXAMPLES OF INDIAN COMPANIES

Current assets form a significant portion of total assets of many Indian companies. Consider the following examples:

	BHEL	*GNFC*	*L&T*	*Voltas*
Sales	7651.1	1476.7	8782.5	1232.3
Total assets (TA)	9600.4	1991.9	17095.9	862.9
Current assets (CA)	8601.0	882.9	11398.4	658.4
CA/TA	89.6	44.3	66.7	76.3
CA/Sales	112.4	59.8	129.8	53.4

Note: Data for the year 2003 except in case of BHEL.

- ***Voltas*** Voltas is a large, well-diversified, private sector marketing-cum-manufacturing organisation. In 2003, the company's current assets are three-fourths of total assets and more than half of sales.
- ***L&T Limited*** L&T is also a diversified company in the private sector. In 2003, its current assets are two-thirds of total assets and about one and a third times of sales.
- ***GNFC*** GNFC is a joint sector (joint venture between state of Gujarat and private sector) company manufacturing fertilizers, industrial products (methanol, formic acid, nitric acid, amonium nitrate, liquid nitrogen etc.) and electronic products. Its current assets in the year 2003 are less than half of total assets and 60 per cent of sales.
- ***BHEL*** BHEL was started as a large public sector company. Its shares have been partly divested now. It has a dominant position in the power sector. Its manufacturing operations are spread into industrial and transportation sectors also. A large number of its products are long production cycle products. The company's main customers are State Electricity Boards who fail to pay their due on time. BHEL's current assets in 2002 are 90 per cent of total assets and 112 per cent of sales.

8.7.1 Current Assets to Fixed Assets Ratio

The financial manager should determine the optimum level of current assets so that the wealth of shareholders is maximised.[8] A firm needs fixed and current assets to support a particular level of output. However, to support the same level of output, the firm can have different levels of current assets. As the firm's output and sales increase, the need for current assets increases. Generally, current assets do not increase in direct proportion to output; current assets may increase at a decreasing rate with output. This relationship is based upon the notion that it takes a greater proportional investment in current assets when only a few units of output are produced than it does later on when the firm can use its current assets more efficiently.[9]

The level of the current assets can be measured by relating current assets to fixed assets.[10] Dividing current assets by fixed assets gives CA/FA ratio. Assuming a constant level of fixed assets, a higher CA/FA ratio indicates a **conservative current assets policy** and a lower CA/FA ratio means an **aggressive current assets policy** assuming other factors to be constant. A conservative policy implies greater liquidity and lower risk; while an aggressive policy indicates higher risk and poor liquidity. **Moderate current assets policy** fall in the middle of conservative and aggressive policies. The current assets policy of the most firms may fall between these two extreme policies. The alternative current assets policies may be shown with the help of Figure 8.4.

In Figure 8.4 alternative A indicates the most conservative policy, where CA/FA ratio is greatest at every level of output. Alternative C is the most aggressive policy, as CA/FA ratio is lowest at

8. The basic principles applicable to working capital management are discussed in Walker, E.W., Towards a Theory of Working Capital, *Engineering Economist,* (Jan.–Feb. 1964), pp. 21–35. Also, see Mehta, Dilip, *Working Capital Management,* Prentice-Hall, 1966.
9. Van Horne, James, C., *Financial Management and Policy,* Prentice-Hall of India Pvt. Ltd., 1975, p. 906.
10. Van Horne, *op. cit.,* Weston, J.F. and Brigham, E.F., *Management Financial,* Holt, Rinehart and Winston, 1972, pp. 516–18.

NOTES

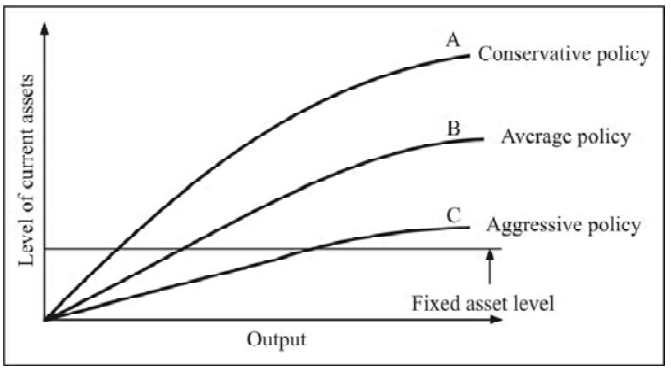


Figure 8.4 Alternative current asset policies

all levels of output. Alternative B lies between the conservative and aggressive policies and is an average policy.

8.7.2 Liquidity vs. Profitability: Risk–Return Trade-off

The firm would make just enough investment in current assets if it were possible to estimate working capital needs exactly. Under perfect certainty, current assets holdings would be at the minimum level. A larger investment in current assets under certainty would mean a low rate of return on investment for the firm, as excess investment in current assets will not earn enough return. A smaller investment in current assets, on the other hand, would mean interrupted production and sales, because of frequent stock-outs and inability to pay to creditors in time due to restrictive policy.

As it is not possible to estimate working capital needs accurately, the firm must decide about levels of current assets to be carried. Given a firm's technology and production policy, sales and demand conditions, operating efficiency etc., its current assets holdings will depend upon its working capital policy. It may follow a conservative or an aggressive policy. These policies involve risk–return trade-offs.[11] A conservative policy means lower return and risk, while an aggressive policy produces higher return and risk.

The two important aims of the working capital management are: *profitability* and *solvency*. **Solvency**, used in the technical sense, refers to the firm's continuous ability to meet maturing obligations. Lenders and creditors expect prompt settlements of their claims as and when due. To ensure solvency, the firm should be very liquid, which means larger current assets holdings. If the firm maintains a relatively large investment in current assets, it will have no difficulty in paying claims of creditors when they become due and will be able to fill all sales orders and ensure smooth production. Thus, a liquid firm has less risk of insolvency; that is, it will hardly experience a cash shortage or a stock-out situation. However, there is a cost associated with maintaining a sound liquidity position. A considerable amount of the firm's funds will be tied up in current assets, and to the extent this investment is idle, the firm's profitability will suffer.

To have higher profitability, the firm may sacrifice solvency and maintain a relatively low level of current assets. When the firm does so, its profitability will improve as fewer funds are tied up in idle current assets, but its solvency would be threatened and would be exposed to greater risk of cash shortage and stock-outs.

Illustration 8.1: Explians the **risk-return trade-off** of the working capital management.

Illustration 8.1: Working Capital Risk-return Trade-off

Suppose, a firm has the following data for some future year:

11. The risk-return analysis of working capital policies are discussed in detail in Van Horne, J.C., A Risk-Return Analysis of a Firm's Working-Capital Position, *Engineering Economist*, (Oct. 1970), pp. 50–58.

	Rs
Sales (100,000 units @ Rs 15)	1,500,000
Earnings before interest and taxes	150,000
Fixed assets	500,000

The three possible current assets holdings of the firm are: Rs 500,000, Rs 400,000 and Rs 300,000. It is assumed that fixed assets level is constant and profits do not vary with current assets levels. The effect of the three alternative current assets policies is shown in Table 8.5.

Table 8.5: Effect of Alternative Working Capital Policies

Working Capital Policy	***Conservative A Rs***	***Moderate B Rs***	***Aggressive B Rs***
Sales	1,500,000	15,00,000	1,500,000
Earnings before interest & taxes (EBIT)	150,000	150,000	150,000
Current assets	500,000	400,000	300,000
Fixed assets	500,000	500,000	500,000
Total assets	1,000,000	900,000	800,000
Return on total assets (EBIT/Total assets)	15%	16.67%	18.75%
Current assets/Fixed assets	1.00	0.80	0.60

The calculations in Table 8.5 indicate that alternative. A, the most conservative policy, provides greatest liquidity (solvency) to the firm, but also the lowest return on total assets. On the other hand, alternative C, the most aggressive policy, yields highest return but provides lowest liquidity and thus, is very risky to the firm. Alternative B demonstrates a moderate policy and generates a return higher than alternative A but lower than alternative C and is less risky than alternative C but more risky than alternative A.

Illustration 8.1 is a simple example of risk–return trade-off.[12] The calculation of risk-return trade-off is difficult in practice. Risk and returns are affected differently by different assets, and generalisation is not possible.

8.7.3 The Cost Trade-off

A different way of looking into the risk-return trade-off is in terms of the cost of maintaining a particular level of current assets. There are two types of costs involved: **cost of liquidity** and **cost of illiquidity**. If the firm's level of current assets is very high, it has excessive liquidity. Its return on assets will be low, as funds tied up in idle cash and stocks earn nothing and high levels of debtors reduce profitability. Thus, the cost of liquidity (through low rates of return) increases with the level of current assets.

The cost of illiquidity is the cost of holding insufficient current assets. The firm will not be in a position to honour its obligations if it carries too little cash. This may force the firm to borrow at high rates of interest. This will also adversely affect the credit-worthiness of the firm and it will face difficulties in obtaining funds in the future. All this may force the firm into insolvency. Similarly, the low level of stocks will result in loss of sales and customers may shift to competitors. Also, low level of debtors may be due to tight credit policy, which would impair sales further. Thus, the low level of current assets involves costs that increase as this level falls.

In determining the optimum level of current assets, the firm should balance the profitability-solvency tangle by minimising total costs—cost of liquidity and cost of illiquidity. This is illustrated in Figure 8.5. It is indicated in the figure that with the level of current assets the cost of liquidity increases while the cost of illiquidity decreases and vice versa. The firm should maintain its current assets at that level where the sum of these two costs is minimised. The minimum cost point indicates the optimum level of current assets in Figure 8.5.

12. See Weston and Brigham, *op. cit.*, pp. 517–18.

NOTES

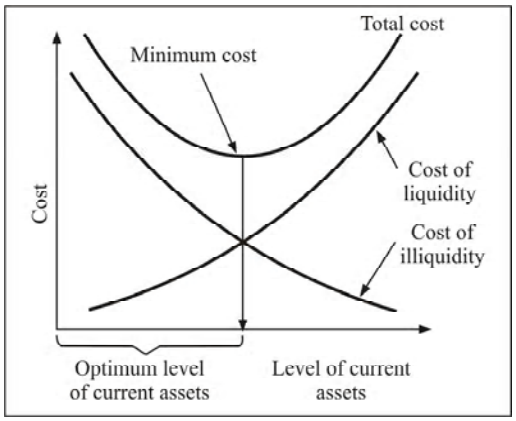


Figure 8.5 Cost Trade-off

8.8 ESTIMATING WORKING CAPITAL NEEDS

The most appropriate method of calculating the working capital needs of a firm is the concept of operating cycle. However, a number of other methods may be used to determine working capital needs in practice. We shall illustrate here three approaches which have been successfully applied in practice:

- ***Current assets holding period*** To estimate working capital requirements on the basis of average holding period of current assets and relating them to costs based on the company's experience in the previous years. This method is essentially based on the operating cycle concept.
- ***Ratio of sales*** To estimate working capital requirements as a ratio of sales on the assumption that current assets change with sales.
- ***Ratio of fixed investment*** To estimate working capital requirements as a percentage of fixed investment.

To illustrate the above methods of estimating working capital requirements and their impact on rate of return we shall take examples of two hypothetical firms (as given in Table 8.6).

Table 8.6: Data for Two Firms

	Firm A *Rs*	*Firm B* *Rs*
Material cost:		
Raw material consumed	248,000	248,000
Less: By-product	68,800	68,800
Net material cost	179,200	179,200
Manufacturing cost		
Labour	171,200	171,200
Maintenance	160,000	160,000
Power and fuel	57,600	57,600
Factory overheads	240,000	240,000
Depreciation	160,000	320,000
Total manufacturing cost	788,800	948,800
Total product cost	968,000	1,128,000
Annual sales	1,448,000	1,448,000
PBIT	480,000	320,000
Investment	1,600,000	3,200,000
Period	1 year	1 year
Plant life	10 year	10 year
PBDIT	640,000	640,000
ROI [PBIT/(investment – depreciation)]	33.3%	11.1%

Check Your Progress

14. What are some of the important issues that the finance manager has to keep in mind while managing a firm's working capital requirements?
15. What are various aspects of working capital management?
16. Write down two main aims of working capital management?

The calculations are based on the following assumptions regarding each of the three methods:

Method 1: Inventory: one month's supply of each of raw material, semifinished goods and finished material. Debtors: one month's sales. Operating cash: one month's total cost.

Method 2: 25–35% of annual sales.

Method 3: 10–20% of fixed capital investment.

The following calculations based on data of firm *A* are made to show how three methods work. You may complete calculations for firm *B*.

Method 1: Current Assets Holding Period

Let us first compute inventory requirements as shown below:

Raw material: one month's supply:

$$\text{Rs } 248{,}000 \div 12 = \text{Rs } 20{,}667$$

Semi-finished material: one month's supply (based on raw material plus assume one-half of normal conversion cost):

$$\text{Rs } 20{,}667 + (\text{Rs } 171{,}200 + \text{Rs } 160{,}000 + \text{Rs } 57{,}600)\ 1/2 \div 12$$
$$= \text{Rs } 20{,}667 + 16{,}200 = \text{Rs } 36{,}867$$

Finished material: one month's supply:

$$\text{Rs } 968{,}000 \div 12 = \text{Rs } 80{,}666$$

The total inventory needs are:

$$\text{Rs } 20{,}667 + \text{Rs } 36{,}867 + \text{Rs } 80{,}666 = \text{Rs } 138{,}200$$

After determining the inventory requirements, projection for debtors and operating cash should be made.

Debtors: One month's sales:

$$\text{Rs } 1{,}448{,}000 \div 12 = \text{Rs } 120{,}667$$

Operating cash: One month's total cost:

$$\text{Rs } 968{,}000 \div 12 = \text{Rs } 80{,}667$$

Thus the total working capital required is:

$$\text{Rs } 138{,}200 + \text{Rs } 120{,}667 + \text{Rs } 80{,}666 = \text{Rs } 339{,}533$$

Method 2: Ratio of Sales

The average ratio is 30 per cent. Therefore, 30 per cent of annual sales, Rs 1,448,000 is Rs 434,400.

Method 3: Ratio of Fixed Investment

The ratio of current assets to fixed investment ranges between 10 to 20 per cent. We shall use the average rate of 15 per centages. The 15 per cent of fixed investment, Rs 1,600,000 is Rs 240,000.

The first method gives details of the working capital items. This approach is subject to error if markets are seasonal. As per the first method the working capital requirement is Rs 339,533. If this figure is considered in calculating the rate of return, it is lowered from 33.3 per cent to 27 per cent. On the other hand, the return of Firm *B* drops from 11.1 per cent to 9.9 per cent. The estimated working capital for firm *B* as per the first method is Rs 366,200. Rates of return are calculated as follows:

$$\text{Rate of return} = \frac{\text{PBIT}}{\text{Net fixed investment} + \text{Working capital}}$$

$$\text{Firm A} = \frac{480{,}000}{[(1{,}600{,}000 - 160{,}000) + 339{,}533]} = 27\%$$

$$\text{Firm B} = \frac{320{,}000}{[(3{,}200{,}000 - 320{,}000) + 366{,}200]} = 9.9\%$$

NOTES

You may notice that investments have been taken net of depreciation.

The second method has a limited reliability. Its accuracy is dependent upon the accuracy of sales estimates. The rate of return of Firm *A* drops to 25.6 per cent and that of Firm *B* to 9.7 per cent when the working capital computed by this method is incorporated.

Third method relates working capital to investment. If estimate of investment is inaccurate, this method cannot be relied upon. This method is not generally used in practice to estimate working capital needs. The rates of return from Firms *A* and *B* are respectively 28.6 per cent and 9.5 per cent when the working capital computed by this method is considered.

A number of factors will govern the choice of methods of estimating working capital. Factors such as seasonal variations in operations, accuracy of sales forecasts, investment cost and variability in sales price would generally be considered. The production cycle and credit and collection policy of the firm would have an impact on working capital requirements. Therefore, they should be given due weightage in projecting working capital requirements.

Example 8.1. From the following projects of ABC Ltd. for the coming year, your are asked to determine the working capital needs of the company.

Annuals Sales: Rs. 15,60,000

Cost of production (including depreciation of Rs. 1,30,000): Rs. 12,50,000

Raw material purchases: Rs. 7,00,000

Opening Stock of raw materials: Rs. 1,50,000

Using stock of raw materials: Rs. 1,30,000

Inventory Norms:

Raw materials: 2 months

Work-in-process: 1/2 month

Finished goods: 1 month

The firm enjoys credit of 1 month or its purchases and also extends credit of 1 month an its supplier. It may be assumed that production is carried out evenly cash balance the year and the minimum cash balance to be maintained is Rs 50,000.

Solution: Determination of net working capital

(I) Current Assets:			(*Rs*)
Cash Balance			50,000
Inventories:			
Raw materials			
Opening Stock	1,50,000		
Add: Purchase	7,00,000		
Less: Closing Stock	1,30,000		
Annual Consumption	7,20,000		
Two months' requirement (7,20,000 × 2/12)			1,20,000
Work-in-process (11,20,000 × 1/24)			46,667
Finished goods (11,20,000 × 1/12)			93,333
Debtors (11,20,000 × 1/12)			93,333
Total Current Assets			4,03,333
(II) Current liabilities:			
Trade creditors (7,00,000 × 1/12)			58,333
(III) Net working capital (I – II)			Rs. 3,45,000

Note: Depreciation is excluded from the cost of production.

Check Your Progress

17. What are the main methods for estimating working capital needs?

Example 8.2. Determination of operating cycle from the information provided below, calculate the operating cycle of the manufacturing company in days:

Period Covered:	365 days
Average period of credit allowed by suppliers:	15 days
Average debtors outstanding	Rs 4,50,000
Raw material consumption	Rs 45,00,000
Total production cost	Rs 110,00,000
Total cost of sales	Rs 120,00,000
Sales for the year	Rs 170,00,000
Value of average stock maintained:	
Raw materials	Rs 3,30,000
Work-in-process	Rs 3,60,000
Finished goods	Rs 3,80,000

Solution:

	(*Days*)
(a) Raw material holding period (365 days × 330/4500)	27
(b) Less creditors payment period	15
(c) Work-in-process holding period (365 days × 380/11000)	13
(d) Finished goods holding period (365 days × 450/17000)	10
Duration of operating cycle	47

Example 8.3. DEF Co. wants to purchase a business and has consulted year. The company wants you to advise them regarding the average amount of working capital. Which will be required in the first year's working.

You are given the following estimates and are instructed to add 10% to your computed figure to allow for contiguities:

	Data for the year (*Rs in '000s*)
(i) Average amount backed up for stocks:	
Stocks of finished product	6,000
Stocks of stores material, etc.	7,000
(ii) Average credit given:	
Inland sales 4 weeks' credit	3,20,000
Export sales 2 week' credit	90,000
(iii) Lag in payment of wages and other outgoings:	
Wages 1 week	1,80,000
Stock, row materials etc. 1/2 months	50,000
Rent, royalties, etc. 3 months	5,000
Clerical staff 1/2 month	65,000
Managers 1/2 month	15,000
Miscellaneous expenses 1 month	30,000
(iv) Payment in advance:	
Sundry expenses (quarterly)	9,000

The calculations have to be made for the average amount of working capital required.

NOTES

Solution:

Statement to Determine Net Working Capital

Amount (Rs in '000s)

(A) Current Assets	
(i) Stocks of finished products	6,000
(ii) Stock of stores, materials, etc.	7,000
(iii) Debtors:	
– Inland sales $\left(3,20,000 \times \frac{4}{52}\right)$	24,615
– Export sales $\left(9,000 \times \frac{2}{52}\right)$	3,462
(iv) Advance payment for sundry expenses $\left(9,000 \times \frac{1}{4}\right)$	2,250
Total Investment in current assets	43,327
(B) Current Liabilities	
(i) Wages $\left(180,000 \times \frac{1}{52}\right)$	3,462
(ii) Stock, row materials, etc. $\left(50,000 \times \frac{1/2}{12}\right)$	6,250
(iii) Rent, royalties, etc. (5,000 × 3/12)	1,250
(iv) Clerical staff $\left(50,000 \times \frac{1/2}{12}\right)$	2,708
(v) Managers $\left(15,000 \times \frac{1/2}{12}\right)$	625
(vi) Miscellaneous expenses $\left(30,000 \times \frac{1}{12}\right)$	2500
Total current liabilities	16,795
(C) Net working Capital:	
(i) Current Assets – Current liabilities	26,532
(ii) *Add:* 10% Contingency Allowance	2,653
Average amount of working capital required	29,185

8.9 POLICIES FOR FINANCING CURRENT ASSETS

A firm can adopt different financing policies *vis-à-vis* current assets. Three types of financing may be distinguished:

- ***Long-term financing*** The sources of long-term financing include ordinary share capital, preference share capital, debentures, long-term borrowings from financial institutions and reserves and surplus (retained earnings).
- ***Short-term financing*** The short-term financing is obtained for a period less than one year. It is arranged in advance from banks and other suppliers of short-term finance in the money market. Short-term finances include working capital funds from banks, public deposits, commercial paper, factoring of receivable etc.

- ***Spontaneous financing*** Spontaneous financing refers to the *automatic* sources of short-term funds arising in the normal course of a business. Trade (suppliers') credit and outstanding expenses are examples of spontaneous financing. There is no explicit cost of spontaneous financing. A firm is expected to utilise these sources of finances to the fullest extent. The real choice of financing current assets, once the spontaneous sources of financing have been fully utilised, is between the long-term and short-term sources of finances.

What should be the mix of short-and long-term sources in financing current assets?

Depending on the mix of short- and long-term financing, the approach followed by a company may be referred to as:

- matching approach
- conservative approach
- aggressive approach

8.9.1 Matching Approach

The firm can adopt a financial plan which matches the expected life of assets with the expected life of the source of funds raised to finance assets. Thus, a ten-year loan may be raised to finance a plant with an expected life of ten years; stock of goods to be sold in thirty days may be financed with a thirty-day commercial paper or a bank loan. The justification for the exact matching is that, since the purpose of financing is to pay for assets, the source of financing and the asset should be relinquished simultaneously. Using long-term financing for short-term assets is expensive as funds will not be utilised for the full period. Similarly, financing long-term assets with short-term financing is costly as well as inconvenient as arrangement for the new short-term financing will have to be made on a continuing basis.

When the firm follows **matching approach** (also known as **hedging approach**), long-term financing will be used to finance fixed assets and permanent current assets and short-term financing to finance temporary or variable current assets. However, it should be realised that exact matching is not possible because of the uncertainty about the expected lives of assets.

Figure 8.6 is used to illustrate the matching plan over time.[13] The firm's fixed assets and permanent current assets are financed with long-term funds and as the level of these assets increases, the long-term financing level also increases. The temporary or variable current assets are financed with short-term funds and as their level increases, the level of short-term financing also increases. Under matching plan, no short-term financing will be used if the firm has a fixed current assets need only.

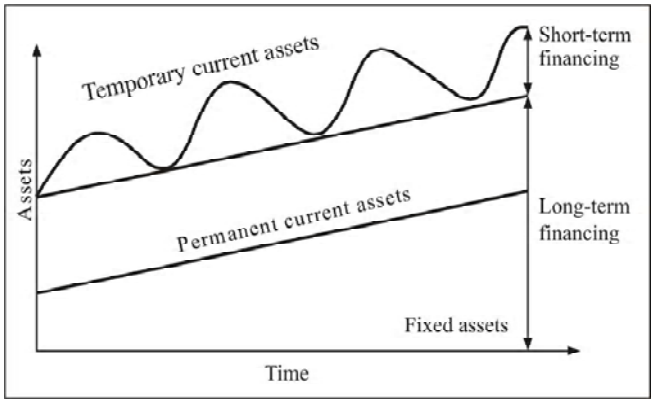


Figure 8.6 Financing under matching plan

8.9.2 Conservative Approach

A firm in practice may adopt a **conservative approach** in financing its current and fixed assets. The financing policy of the firm is said to be conservative when it depends more on long-term funds

13. Weston and Brigham, *op. cit.*, p. 510.

NOTES

for financing needs. Under a conservative plan, the firm finances its permanent assets and also a part of temporary current assets with long-term financing. In the periods when the firm has no need for temporary current assets, the idle long-term funds can be invested in the tradable securities to conserve liquidity. The conservative plan relies heavily on long-term financing and, therefore, the firm has less risk of facing the problem of shortage of funds. The conservative financing policy is shown in Figure 8.7.[14] Note that when the firm has no temporary current assets [e.g., at (*a*) and (*b*)]; the long-term funds released can be invested in marketable securities to build up the liquidity position of the firm.

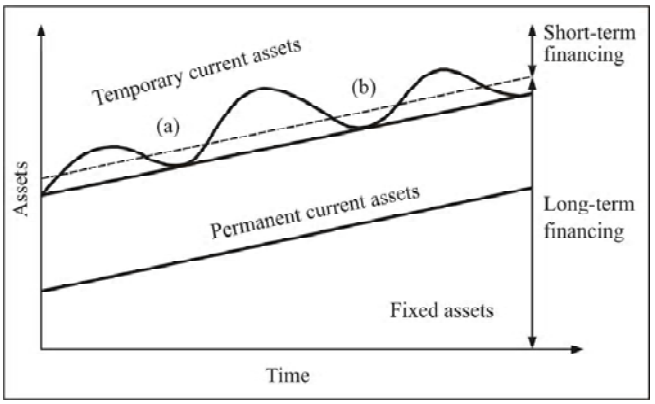


Figure 8.7 Conservative financing

8.9.3 Aggressive Approach

A firm may be aggressive in financing its assets. An **aggressive policy** is said to be followed by the firm when it uses more short-term financing than warranted by the matching plan. Under an aggressive policy, the firm finances a part of its permanent current assets with short-term financing. Some extremely aggressive firms may even finance a part of their fixed assets with short-term financing. The relatively more use of short-term financing makes the firm more risky. The aggressive financing is illustrated in Figure 8.8.[15]

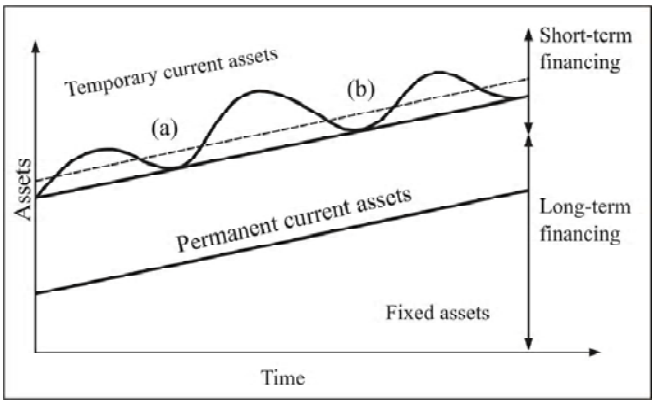


Figure 8.8 Aggressive financing

8.9.4 Short-term *vs.* Long-term Financing: A Risk-Return Trade-off

A firm should decide whether or not it should use short-term financing. If short-term financing has to be used, the firm must determine its portion in total financing. This decision of the firm will be guided by the risk-return trade-off. Short-term financing may be preferred over long-term financing for two reasons: (*i*) the cost advantage and (*ii*) flexibility.[16] But short-term financing is more risky than long-term financing.

14. *Ibid*., p. 511.
15. *Ibid*.
16. Also see Western and Brigham, *op. cit*., pp. 512–13.

Cost: Short-term financing should generally be less costly than long-term financing. It has been found in developed countries, like USA, that the rate of interest is related to the maturity of debt. The relationship between the maturity of debt and its cost is called the **term structure of interest rates**. The curve, relating to the maturity of debt and interest rates, is called the **yield curve**. The yield curve may assume any shape, but it is generally *upward sloping*. Figure 8.9 shows the yield curve. The figure indicates that more the maturity greater the interest rate.

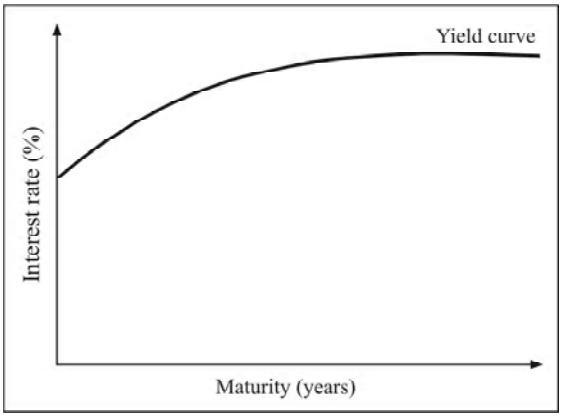


Figure 8.9 Yield curve

As discussed earlier in this book, the justification for the higher cost of long-term financing can be found in the **liquidity preference theory**. This theory says that since lenders are risk averse, and risk generally increases with the length of lending time (because it is more difficult to forecast the more distant future), most lenders would prefer to make short-term loans. The only way to induce these lenders to lend for longer periods is to offer them higher rates of interest.

The cost of financing has an impact on the firm's return. Both short and long-term financing have a leveraging effect on shareholders' return. But the short-term financing ought to cost less than the long-term financing; therefore, it gives relatively higher return to shareholders.

It is noticeable that in India short-term loans cost more than long-term loans. Banks are the major suppliers of the working capital finance in India. Their rates of interest on working capital finance are quite high. The main source of long-term loans are financial institutions which till recently were not charging interest at differential rates. The prime rate of interest charged by financial institutions is lower than the rate charged by banks.

Flexibility It is relatively easy to refund short-term funds when the need for funds diminishes. Long-term funds such as debenture loan or preference capital cannot be refunded before time. Thus, if a firm anticipates that its requirements for funds will diminish in near future, it would choose short-term funds.

Risk Although short-term financing may involve less cost, it is more risky than long-term financing. If the firm uses short-term financing to finance its current assets, it runs the risk of renewing borrowings again and again. This is particularly so in the case of permanent assets. As discussed earlier, permanent current assets refer to the minimum level of current assets which a firm should always maintain. If the firm finances its permanent current assets with short-term debt, it will have to raise new short-term funds as debt matures. This continued financing exposes the firm to certain risks. It may be difficult for the firm to borrow during stringent credit periods. At times, the firm may be unable to raise any funds and consequently, its operating activities may be disrupted. In order to avoid failure, the firm may have to borrow at most inconvenient terms. These problems are much less when the firm finances with long-term funds. There is less risk of failure when the long-term financing is used.

Risk-return trade-off Thus, there is a conflict between long-term and short-term financing. Short-term financing is less expensive than long-term financing, but, at the same time, short-term financing involves greater risk than long-term financing. The choice between long-term and short-term financing involves a trade-off between risk and return. This trade-off may be further explained with the help of an example in Illustration 8.2.

NOTES

Illustration 8.2: Working Capital Financing: Risk-return Trade-off

Suppose that a firm has an investment of Rs 50 crore in assets, Rs 30 crore invested in fixed assets and Rs 20 crore in current assets. It is expected that assets will yield a return of 18 per cent before interest and taxes. Tax rate is assumed to be 35 per cent. The firm maintains a debt ratio of 60 per cent. Thus, the firm's assets are financed by 40 per cent equity that is Rs 20 crore equity funds are invested in its total assets. The firm has to decide whether it should use a 12 per cent short-term debt or a 14 per cent long-term debt to finance its current assets. The financing plans would affect the return on equity funds differently. The calculations of return on equity are shown in Table 8.7.

Table 8.7: Effect of Long-Term and Short-Term Financing

	Financing Plan		
	Conservative	***Moderate***	***Aggressive***
	Rs '000	***Rs '000***	***Rs '000***
Fixed assets	300,000	300,000	300,000
Current assets	200,000	200,000	200,000
Total assets	500,000	500,000	500,000
Short-term debt (12%)	60,000	150,000	300,000
Long-term debt (14%)	240,000	150,000	0
PBIT	90,000	90,000	90,000
Interest	40,800	39,000	36,000
EBT	49,200	51,000	54,000
Tax (35%)	17,220	17,850	18,900
Net income	31,980	33,150	35,100
Return on equity	16.00%	16.58%	17.55%
SF/TF	12%	30%	60%

* SF = Short-term financing, TF = Total financing.

It is shown in Table 8.7 that return on equity is highest under the aggressive plan and lowest under the conservative plan. The results of moderate plan are in between these two extremes. However, the aggressive plan is the most risky as short-term financing as a ratio of total financing is maximum in this case. The short-term financing to total financing ratio is minimum in case of the conservative plan and, therefore, it is less risky.

Let us summarise our discussion on the structure and financing of current assets. The relative liquidity of the firms assets structure is measured by current assets to fixed assets (or current assets to total assets) ratio. The greater this ratio, the less risky as well as less profitable will be the firm and *vice versa*. Similarly, the relative liquidity of the firm's financial structure can be measured by the short-term financing to total financing ratio. The lower this ratio, the less risky as well as profitable will be the firm and *vice versa*. In shaping its working capital policy, the firm should keep in mind these two dimensions—*relative asset liquidity* (level of current assets) and *relative financing liquidity* (level of short-term financing) of the working capital management. A firm will be following a very conservative working capital policy if it combines a high level of current assets with a high level of long-term financing (or low level of short-term financing). Such a policy will not be risky at all but would be less profitable. An aggressive firm, on the other hand, would combine low level of current assets with a low level of long-term financing (or high level of short-term financing). This firm will have high profitability and high risk. In fact, the firm may follow a conservative financing policy to counter its relatively liquid assets structure in practice. The conclusion of all this is that the considerations of assets and financing mix are crucial to the working capital management.

Check Your Progress

18. What are the main long-term and short- term sources for financing working capital?
19. What should be the mix of short-term and long term sources in financing current assets?

8.10 SOURCES OF WORKING CAPITAL

External funds available for a period of one year or less are called short-term finance. In India, short-term funds are used to finance working capital. Two most significant short-term sources of finance for working capital are: trade credit and bank borrowing. The use of trade credit has been increasing over years in India. Trade credit as a ratio of current assets is about 40 per cent. Bank borrowing is the next important source of working capital finance. Before seventies, bank credit

was liberally available to firms. It became a restricted resource in eighties and nineties because of the change in the government policy; banks were required to follow the government prescribed norms in financing working capital requirements of firms. Now there are no government norms, and banks are free to take business decisions in granting finance for working capital.

Two other short-term sources of working capital finance which have recently developed in India are: (*i*) factoring of receivables and (*ii*) commercial paper. We have already discussed factoring in an earlier chapter.

8.10.1 Trade Credit

Trade credit refers to the credit that a customer gets from suppliers of goods in the normal course of business. In practice, the buying firms do not have to pay cash immediately for the purchases made. This deferral of payments is a short-term financing called trade credit. It is a major source of financing for firms. In India, it contributes to about one-third of the short-term financing. Particularly, small firms are heavily dependent on trade credit as a source of finance since they find it difficult to raise funds from banks or other sources in the capital markets.

Trade credit is mostly an informal arrangement, and is granted on an **open account** basis. A supplier sends goods to the buyer on credit which the buyer accepts, and thus, in effect, agrees to pay the amount due as per sales terms in the invoice. However, he does not formally acknowledge it as a debt; he does not sign any legal instrument. Once the trade links have been established between the buyer and the seller, they have each other's mutual confidence, and trade credit becomes a routine activity which may be periodically reviewed by the supplier. Open account trade credit appears as **sundry creditors** (known as **accounts payable** in USA) on the buyer's balance sheet. Trade credit may also take the form of **bills payable**. When the buyer signs a bill—a negotiable instrument—to obtain trade credit, it appears on the buyer's balance sheet as bills payable. The bill has a specified future date, and is usually used when the supplier is less sure about the buyer's willingness and ability to pay, or when the supplier wants cash by discounting the bill from a bank. A bill is formal acknowledgement of an obligation to repay the outstanding amount. In USA, **promissory notes**—a formal acknowledgement of an obligation with a promise to pay on a specified date—are used as an alternative to the open account, and they appear as **notes payable** in the buyer's balance sheet.

Credit Terms **Credit terms** refer to the conditions under which the supplier sells on credit to the buyer, and the buyer is required to repay the credit. These conditions include the *due date* and the *cash discount* (if any) given for prompt payment. *Due date* (also called net date) is the date by which the supplier expects payment. Credit terms indicate the length and beginning date of the credit period. *Cash discount* is the concession offered to the buyer by the supplier to encourage him to make payment promptly. The cash discount can be availed by the buyer if he pays by a certain date which is quite earlier than the due date. The typical way of expressing credit terms is, for example, as follows: '3/15, net 45'. This implies that a 3 per cent discount is available if the credit is repaid on the 15th day, and in case the discount is not taken, the payment is due by the 45th day.

Benefits and Costs of Trade Credit As stated earlier, trade credit is normally available to a firm; therefore, it is a **spontaneous source of financing**. As the volume of the firm's purchase increases, trade credit also expands. Suppose that a firm increases its purchases from Rs 50,000 per day to Rs 60,000 per day. Assume that these purchases are made on credit terms of 'net 45', and the firm makes payment on the 45th day. The average accounts payable outstanding (trade credit finance) will expand to Rs 27 lakh (Rs 60,000 × 45) from Rs 22.50 lakh (Rs 50,000 × 45).

The major advantages of trade credit are as follows:[17]

- ***Easy availability*** Unlike other sources of finance, trade credit is relatively easy to obtain. Except in the case of financially very unsound firms, it is almost automatic and does not require any negotiations. The easy availability is particularly important to small firms which generally face difficulty in raising funds from the capital markets.

17. Moyer, R.C., *et. al., Contemporary Financial Management*, West Publishing Co., 1980, p. 666.

NOTES

- ***Flexibility*** Flexibility is another advantage of trade credit. Trade credit grows with the growth in firm's sales. The expansion in the firm's sales causes its purchases of goods and services to increase which is automatically financed by trade credit. In contrast, if the firm's sales contract, purchases will decline and consequently trade credit will also decline.
- ***Informality*** Trade credit is an informal, spontaneous source of finance. It does not require any negotiations and formal agreement. It does not have the restrictions which are usually parts of negotiated sources of finance.

Is trade credit a cost free source of finance? It appears to be cost free since it does not involve explicit interest charges. But in practice, it involves *implicit cost.* The cost of credit may be transferred to the buyer via the increased price of goods supplied to him. The user of trade credit, therefore, should be aware of the costs of trade credit to make use of it intelligently. The reasoning that it is cost free can lead to incorrect financing decisions.

The supplier extending trade credit incurs costs in the form of the opportunity cost of funds invested in accounts receivable and cost of any cash discount taken by the buyer. Does the supplier bear these costs? Most of the time he passes on all or part of these costs to the buyer implicitly in the form of higher purchase price of goods and services supplied. How much of the costs can he really pass on depends on the market supply and demand conditions. Thus if the buyer is in a position to pay cash immediately, he should try to avoid implicit costs of trade credit by negotiating lower purchase price with the supplier.

Credit terms sometimes include cash discount if the payment is made within a specified period. The buyer should take a decision whether or not to avail it. A trade-off is involved. If the buyer takes discount, he benefits in terms of less cash outflow, but then he foregoes the credit granted by the supplier beyond the discount period. In contrast, if he does not take discount, he avails credit for the extended period but pays more. The buyer incurs an opportunity cost when he does not avail cash discount. Suppose that the Nirmal Company is extended Rs 100,000 credit on terms of '2/15, net 45'. As shown in Figure 8.10, Nirmal can either pay less amount (100,000 – 0.02 × 100,000 = Rs 98,000) by the end of the discount period i.e. the 15th day or the full amount (Rs 100,000) by the end of the credit period i.e. the 45th day. If the firm foregoes cash discount and does not pay on the 15th day, it can use Rs 98,000 for an additional period of 30 days, and implicitly paying Rs 2,000 in interest. If a credit of Rs 98,000 is available for 30 days by paying Rs 2,000 as interest, how much is the annual rate of interest? It can be found as follows:

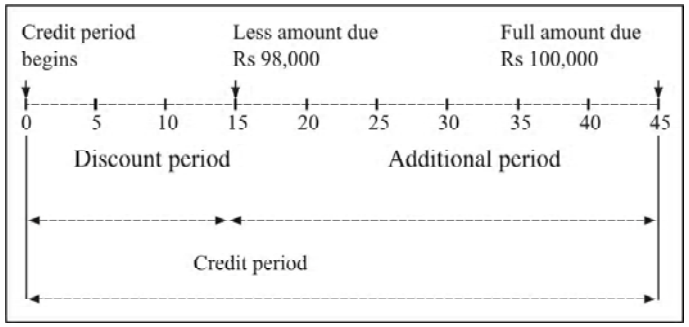


Figure 8.10: Cost of cash discount

$$\text{Implicit interest rate} = \frac{2{,}000}{98{,}000} \times \frac{360}{30} = 0.245 \text{ or } 24.5\%$$

We can also use the following formula to calculate the implicit rate of interest:

Implicit interest rate:

$$\frac{\%\ \text{Discount}}{100 - \%\ \text{Discount}} \times \frac{360}{\text{Credit period} - \text{Discount period}} \quad (1)$$

Using data of our example, we obtain:

$$= \frac{2}{100-2} \times \frac{360}{45-15} = \frac{2}{98} \times \frac{360}{30} = 0.245 \text{ or } 24.5\%$$

As the example above indicates, the annual opportunity cost of foregoing cash discount can be very high. Therefore, a firm should compare the opportunity cost of trade credit with the costs of other sources of credit while making its financing decisions.

For meeting its financing needs, should a company stretch its accounts payable? When a firm delays the payment of credit beyond the due date, it is called **stretching accounts payable**. Stretching accounts payable does generate additional short-term finances, but it can prove to be a very costly source. The firm will have to forgo the cash discount and may also be required to pay penalty interest charges. Thus the firm will not only be charged higher implicit costs, but its creditworthiness will also be adversely affected. If the firm stretches accounts payable frequently, it may not be able to obtain any credit in future. It may also find it difficult to obtain finances from other sources once its creditworthiness is seriously damaged.

8.10.2 Accrued Expenses and Deferred Income

In addition to trade credit, accrued expenses and deferred income are other spontaneous sources of short-term financing.[18] Accrued expenses are more automatic source since, by definition, they permit the firm to receive services before paying for them.

Accrued Expenses **Accrued expenses** represent a liability that a firm has to pay for the services which it has already received. Thus they represent a spontaneous, interest-free sources of financing. The most important component of accruals are wages and salaries, taxes and interest.

Accrued wages and salaries represent obligations payable by the firm to its employees. The firm incurs a liability the moment employees have rendered services. They are, however, paid afterwards, usually at some fixed interval like one month. The longer the payment interval, the greater the amount of funds provided by the employees. Legal and practical aspects constrain the flexibility of a firm in lengthening the payment interval.

Accrued taxes and interest constitute another source of financing. Corporate taxes are paid after the firm has earned profits. These taxes are paid quarterly during the year in which profits are earned. This is a deferred payment of the firm's obligation and thus, is a source of finance. Like taxes, interest is paid periodically during a year while the firm continuously uses the borrowed funds. Thus accrued interest on borrowed funds requiring semi-annual interest payments can be used as a source of financing for a period as long as six months. Note that these expenses are not postponable for long and a firm does not have much control over their frequency and magnitude. It is a limited source of short-term financing.

Deferred Income It represents funds received by the firm for goods and services which it has agreed to supply in future. These receipts increase the firm's liquidity in the form of cash; therefore, they constitute an important source of financing.

Advance payments made by customers constitute the main item of deferred income. These payments are common in case of expensive products like boilers, turnkey projects, large contracts or where the product is in short supply and the seller has a strong bargaining power as compared to the buyer. These payments are not recorded as revenue until goods and services have been delivered to the customers. They are, therefore, shown as a liability in the firm's balance sheet.

8.10.3 Bank Finance for Working Capital

Banks are the main institutional sources of working capital finance in India. After trade credit, bank credit is the most important source of financing working capital requirements. A bank considers a firm's sales and production plans and the desirable levels of current assets in determining its working capital requirements. The amount approved by the bank for the firm's working capital is called **credit limit.** Credit limit is the maximum funds which a firm can obtain from the banking system. In the case of firms with seasonal businesses, banks may fix separate limits for the **peak level credit** requirement and normal, **non-peak level credit** requirement indicating the

18. Moyer, *et. al., op. cit.,* p. 667.

NOTES

periods during which the separate limits will be utilised by the borrower. In practice, banks do not lend 100 per cent of the credit limit; they deduct **margin money.** Margin requirement is based on the principle of conservatism and is meant to ensure security. If the margin requirement is 30 per cent, bank will lend only up to 70 per cent of the value of the asset. This implies that the security of bank's lending should be maintained even if the asset's value falls by 30 per cent.

Forms of Bank Finance A firm can draw funds from its bank within the maximum credit limit sanctioned. It can draw funds in the following forms: (*a*) overdraft, (*b*) cash credit, (*c*) bills purchasing or discounting, and (*d*) working capital loan.

Overdraft Under the overdraft facility, the borrower is allowed to withdraw funds in excess of the balance in his current account up to a certain specified limit during a stipulated period. Though overdrawn amount is repayable on demand, they generally continue for a long period by annual renewals of the limits. It is a very flexible arrangement from the borrower's point of view since he can withdraw and repay funds whenever he desires within the overall stipulations. Interest is charged on daily balances—on the amount actually withdrawn—subject to some minimum charges. The borrower operates the account through cheques.

Cash credit The cash credit facility is similar to the overdraft arrangement. It is the most popular method of bank finance for working capital in India. Under the cash credit facility, a borrower is allowed to withdraw funds from the bank upto the sanctioned credit limit. He is not required to borrow the entire sanctioned credit once, rather, he can draw periodically to the extent of his requirements and repay by depositing surplus funds in his cash credit account. There is no commitment charge; therefore, interest is payable on the amount actually utilised by the borrower. Cash credit limits are sanctioned against the security of current assets. Though funds borrowed are repayable on demand, banks usually do not recall such advances unless they are compelled by adverse circumstances. Cash credit is a most flexible arrangement from the borrower's point of view.

Purchase or discounting of bills Under the purchase or discounting of bills, a borrower can obtain credit from a bank against its bills. The bank purchases or discounts the borrower's bills. The amount provided under this agreement is covered within the overall cash credit or overdraft limit. Before purchasing or discounting the bills, the bank satisfies itself as to the creditworthiness of the drawer. Though the term 'bills purchased' implies that the bank becomes owner of the bills, in practice, bank holds bills as security for the credit. When a bill is discounted, the borrower is paid the discounted amount of the bill (viz., full amount of bill minus the discount charged by the bank). The bank collects the full amount on maturity.

To encourage bills as instruments of credit, the Reserve Bank of India introduced the new bill market scheme in 1970. The scheme was intended to reduce the borrowers' reliance on the cash credit system which is susceptible to misuse. It was also envisaged that the scheme will facilitate banks to deploy their surpluses or deficits by rediscounting or selling the bills purchased or discounted by them. Banks with surplus funds could repurchase or rediscount bills in the possession of banks with deficits. There can be situation where every bank wants to sell its bills. Therefore, the Reserve Bank of India plays the role of the lender of last resort under the new bill market scheme. Unfortunately, the scheme has not worked successfully so far.

Letter of credit Suppliers, particularly the foreign suppliers, insist that the buyer should ensure that his bank will make the payment if he fails to honour its obligation. This is ensured through a letter of credit (L/C) arrangement. A bank opens an L/C in favour of a customer to facilitate his purchase of goods. If the customer does not pay to the supplier within the credit period, the bank makes the payment under the L/C arrangement. This arrangement passes the risk of the supplier to the bank. Bank charges the customer for opening the L/C. It will extend such facility to financially sound customers. Unlike cash credit or overdraft facility, the L/C arrangement is an indirect financing; the bank will make payment to the supplier on behalf of the customer only when he fails to meet the obligation.

Working capital loan A borrower may sometimes require *ad hoc* or temporary accommodation in excess of sanctioned credit limit to meet unforeseen contingencies. Banks provide such accommodation through a **demand loan** account or a separate **non-operable cash credit account**.

The borrower is required to pay a higher rate of interest above the normal rate of interest on such additional credit.

Security Required in Bank Finance Banks generally do not provide working capital finance without adequate security. The following are the modes of security which a bank may require.

NOTES

Hypothecation Under hypothecation, the borrower is provided with working capital finance by the bank against the security of movable property, generally inventories. The borrower does not transfer the property to the bank; he remains in the possession of property made available as security for the debt. Thus hypothecation is a charge against property for an amount of debt where neither ownership nor possession is passed to the creditor. Banks generally grant credit hypothecation only to first class customers with highest integrity. They do not usually grant hypothecation facility to new borrowers.

Pledge Under this arrangement, the borrower is required to transfer the physical possession of the property offered as a security to the bank to obtain credit. The bank has a right of lien and can retain possession of the goods pledged unless payment of the principal, interest and any other expenses is made. In case of default, the bank may either (*a*) sue the borrower for the amount due, or (*b*) sue for the sale of goods pledged, or (*c*) after giving due notice, sell the goods.

Mortgage Mortgage is the transfer of a legal or equitable interest in a specific immovable property for the payment of a debt. In case of mortgage, the possession of the property may remain with the borrower, with the lender getting the full legal title. The transferor of interest (borrower) is called the mortgagor, the transferee (bank) is called the mortgagee, and the instrument of transfer is called the mortgage deed.

The credit granted against immovable property has some difficulties. They are not self-liquidating. Also, there are difficulties in ascertaining the title and assessing the value of the property. There is limited marketability, and therefore, security may often be difficult to realise. Also, without the court's decree, the property cannot be sold. Usually, for working capital finance, the mode of security is either hypothecation or pledge. Mortgages may be taken as additional security.

Lien Lien means right of the lender to retain property belonging to the borrower until he repays credit. It can be either a particular lien or general lien. Particular lien is a right to retain property until the claim associated with the property is fully paid. General lien, on the other hand, is applicable till all dues of the lender are paid. Banks usually enjoy general lien.

8.10.4 Commercial Paper

Commercial paper (CP) is an important money market instrument in advanced countries like USA to raise short-term funds. In India, on the recommendation of the Vaghul Working Group, the Reserve Bank of India (RBI) introduced the commercial paper scheme in the Indian money market in 1989. Commercial paper, as it is known in the advanced countries, is a form of unsecured promissory note issued by firms to raise short-term funds. The commercial paper market in the USA is a blue-chip market where financially sound and highest rated companies are able to issue commercial papers. The buyers of commercial papers include banks, insurance companies, unit trusts and firms with surplus funds to invest for a short period with minimum of risk. Given this investment objective of the investors in the commercial paper market, there would exist demand for commercial papers of highly creditworthy companies.

Use and Maturity In India, the Reserve Bank of India regulates the issue of commercial papers. Those companies are allowed to issue commercial papers which have a net worth of Rs 10 crore, i.e., Rs 100 million, maximum permissible bank finance of not less than Rs 25 crore, and are listed on the stock exchange. The Vaghul Working Group recommended that the size of a single issue should be at least Rs 1 crore and the size of each commercial paper should not be less than Rs 5 lakh. The RBI has provided for the minimum issue of Rs 25 lakh (rather than Rs 5 lakh recommended by the Vaghul Committee). These norms imply that only the large, highly rated companies are able to operate in the commercial paper market in India. In fact, in USA it is mostly the largest companies that raise funds from the commercial paper market. However, recently some smaller companies and large foreign companies have been

NOTES

able to tap the commercial paper market in USA. A company can issue CPs amounting to 75 per cent of the permitted bank credit.

What is the maturity of commercial papers? In the USA it runs from 1 to 270 days. In India, on the other hand, the maturity runs between 91 to 180 days. In USA, the commercial paper market existed for long period, but the use of commercial paper started since the World War II and increased in a significant way during 1960s and 1970s because of the tight money conditions. In recent years, some US companies have made aggressive use of commercial papers and have used them even for the partial financing of the long-term assets. In India, it is expected that commercial paper will be used only for short-term financing and as an alternative source of finance to bank credit and other short-term sources. Since the beginning of 1993, the volume of CPs has significantly increased because of the large surplus funds available from the banking sector as well as limited availability of other assets. On 31 August 2003, the commercial paper total amount outstanding was Rs 7,646 crore. The low and high interest rates were, respectively, 5 per cent and 6.65 per cent, showing a spread of 165 basis points.

Cost Though the Reserve Bank of India regulates the issue of commercial paper, the market determines the interest rate. In advanced countries like USA, the interest rate on a commercial paper is a function of prime lending rate, maturity, credit-worthiness of the issuer and the rating of the paper provided by the rating agency. In the USA two main rating agencies—Standard and Poor and Moody—have three-point rating schemes with the safest paper rated 1 and the riskiest 3. In India, there are three rating companies – CRISIL, CARE and ICRA that provide ratings for CPs. CRISIL awards P1 plus, P1, P2 plus, and P2 ratings for CPs, and ICRA awards five ratings: A1 plus, A2, A3, A4 and A5. Rating depends on debt obligations, cash accruals, unused cash credit limits and tradable securities like units.

Interest rate on commercial paper is generally less than the bank borrowing rate. A firm does not pay interest on commercial paper rather sells it at a discount rate from face value. The yield calculated on this basis is referred to as interest yield. The interest yield can be found as follows:

$$\text{Interest yield} = \frac{\begin{bmatrix}\text{Face}\\ \text{value}\end{bmatrix} - \begin{bmatrix}\text{Sale}\\ \text{price}\end{bmatrix}}{\text{Sale price}} \times \frac{360}{\text{Days of maturity}} \qquad (2)$$

Sales price will be net of flotation costs associated with the issue of commercial paper. Suppose a firm sells 120-day commercial paper (Rs 100 face value) for Rs 96 net, the interest yield will be 12.5 per cent:

$$\text{Interest yield} = \left[\frac{100-96}{96}\right]\left[\frac{360}{120}\right] = 0.125 \text{ or } 12.5 \text{ per cent}$$

Interest on CP is tax deductible: therefore, the after-tax interest will be less. Assuming that the firm's marginal tax rate is 35 per cent, the after-tax interest yield is 8.13 per cent:

$$0.125\,(1-0.35) = 0.0813 \text{ or } 8.13 \text{ per cent.}$$

In India, the cost of a CP will include the following components:

- discount
- rating charges
- stamp duty
- issuing and paying agent (IPA) charges

Illustration 8.3: Cost of Commercial Paper

Suppose a company issues a 90-day CP of a face value of Rs 1,000 at Rs 985. The credit rating expenses are 0.5 per cent of the size of issue, IPA charges being 0.35 per cent and stamp duty 0.5 per cent. What is the cost of CP?

The discount is Rs 15 and rating and IPA charges and stamp duty amounts to: 1.35 per cent × Rs 1,000 = Rs 13.5. Thus, the cost of CP is:

$$\text{Cost of CP} = \frac{15+13.5}{985} \times \frac{360}{90} = 0.1157 \text{ or } 11.6\%$$

Merits and Demerits There are two important advantages of commercial paper from the issuing firm's point of view:

- It is an alternative source of raising short-term finance, and proves to be handy during periods of tight bank credit.
- It is a cheaper source of finance in comparison to the bank credit. Usually, interest yield on commercial paper is less than the prime rate of interest.

From an investor's point of view, it provides an opportunity to make a safe, short-term investment of surplus funds.

The following are the limitations of this source of financing:

- It is an *impersonal* method of financing. If a firm is unable to redeem its paper due to financial difficulties, it may not be possible for it to get the maturity of paper extended.
- It is always available to the financially sound and highest rated companies. A firm facing temporary liquidity problems may not be able to raise funds by issuing new paper.
- The amount of loanable funds available in the commercial paper market is limited to the amount of excess liquidity of the various purchasers of commercial paper.
- It cannot be redeemed until maturity. Thus if a firm doesn't need the funds any more, it cannot repay it until maturity and will have to incur interest costs.

8.11 LET US SUMMARIZE

- ❖ Gross working capital refers to the firm's investment in current assets.
- ❖ Net working capital means the difference between current assets and current liabilities, and therefore, represents that position of current assets which the firm has to finance either from long-term funds or bank borrowings.
- ❖ A firm is required to invest in current assets for a smooth, uninterrupted production and sale. How much a firm will invest in current assets will depend on its operating cycle.
- ❖ Operating cycle is defined as the time duration which the firm requires to manufacture and sell the product and collect cash. Thus operating cycle refers to the acquisition of resources, conversion of raw materials into work-in-process into finished goods, conversion of finished goods into sales and collection of sales. Larger is the operating cycle, larger will be the investment in current assets.
- ❖ In practice, firms acquire resources on credit. To that extent, firm's need to raise working finance is reduced.
- ❖ The term net operating cycle is used for the difference between operating cycle (or gross operating cycle) and the payment deferral period (or the period for which creditors remain outstanding).
- ❖ The manufacturing cycle (that is conversion of raw material into work-in-process into finished goods) is a component of operating cycle, and therefore, it is a major determinant of working capital requirement. Manufacturing cycle depends on the firm's choice of technology and production policy.
- ❖ The firm's credit policy is another factor which influences the working capital requirement. It depends on the nature and norms of business, competition and the firm's desire to use it as a marketing tool.
- ❖ The requirement for working capital finance will be reduced to the extent the firm is able to exploit the credit extended by suppliers. Depending on the possible availability of working

NOTES

Check Your Progress

20. List the main sources of working capital.
21. What are the main forms by means of which firms may avail working capital finance from banks?

NOTES

capital finance and its own profitability, a firm may carry more or less investment in current assets than warranted by technical factors.

- The firm's decision about the level of investment in current assets involves a trade-off between risk and return. When the firm invests more in current assets it reduces the risk of illiquidity, but loses in terms of profitability since the opportunity of earning from the excess investment in current assets is lost. The firm therefore is required to strike a right balance.
- The financing of current assets also involves a trade-off between risk and return. A firm can choose from short- or long-term sources of finance.
- If the firm uses more of short-term funds for financing both current and fixed assets, its financing policy is considered aggressive and risky.
- Its financing policy will be considered conservative if it makes relatively more use in financing its assets.
- A balanced approach is to finance permanent current assets by long-term sources and 'temporary' current assets by short-term sources of finance. Theoretically, short-term debt is considered to be risky and costly to finance permanent current assets.
- Most important short-term sources of financing current assets are: (*a*) trade credit, (*b*) deferred income and accrued expenses, and (*c*) bank finance. The first two sources are available in the normal course of business, and therefore, they are called spontaneous sources of working capital finance. They do not involve any explicit costs. Bank finances have to be negotiated and involve explicit costs. They are called non-spontaneous or negotiated sources of working capital finance. Two alternative ways of raising short-term finances in India are: factoring and commercial paper.
- Trade credit refers to the credit that a buyer obtains from the suppliers of goods and services. Payment is required to be made within a specified period. Suppliers sometimes offer cash discount to buyers for making prompt payment. Buyer should calculate the cost of foregoing cash discount to decide whether or not cash discount should be availed. The following formula can be used:

$$\frac{\%\ \text{Discount}}{100 - \%\ \text{Discount}} \times \frac{360}{\text{Credit period} - \text{Discount period}}$$

- A buyer should also consider the implicit costs of trade credit, and particularly, that of stretching accounts payable. These implicit costs may be built into the prices of goods and services. Buyer can negotiate for lower prices for making payment in cash.
- Accrued expenses and deferred income also provide some funds for financing working capital. However, it is a limited source as payment of accrued expenses cannot be postponed for a long period. Similarly, advance income will be received only when there is a demand–supply gap or the firm is a monopoly.
- Bank finance is the most commonly negotiated source of the working capital finance. It can be availed in the forms of overdraft, cash credit, purchase/discount of bills and loan. Each company's working capital need is determined as per the norms. Banks are the largest providers of working capital finance to firms.
- Commercial paper is an important money market instrument for raising short-term finances. Firms, banks, insurance companies, individuals etc. with short-term surplus funds invest in commercial papers. Investors would generally invest in commercial paper of a financially sound and creditworthy firm. In India, commercial papers of 91 to 180 days maturity are being floated. The interest rate will be determined in the market. The yield on commercial paper can be calculated as follows:

$$\text{CP yield} = [\text{Face value} - \text{Sale price} / \text{Sale price}] \times [360 / \text{Days to maturity}]$$

NOTES

8.12 KEY CONCEPTS

Bank Finance (MPBF)
Cash conversion cycle
Cash credit system
Chargeable current assets
Commercial paper
Core current assets
Credit limit
Financing policy
Gross working capital
Hypothecation
Letter of credit (L/C)
Lien
Liquidity preference theory
Liquidity-profitability trade-off
Manufacturing cycle
Margin money
Maximum Permissible
Mortgage
Net working capital
Non-peak level credit
Open account credit
Operating cycle
Overdraft financing
Peak level credit
Permanent working capital
Pledge
Spontaneous financing
Stretching accounts payable
Term structure of interest rates
Trade credit
Variable working capital
Working capital gap
Working capital policy
Yield curve

8.13 ILLUSTRATIVE SOLVED PROBLEMS

Problem 8.1: A proforma cost sheet of a company provides the following data:

	Rs
Costs (per unit):	
Raw materials	52.0
Direct labour	19.5
Overheads	39.0
Total cost (per unit)	110.5
Profit	19.5
Selling price	130.0

The following is the additional information available:

Average raw material in stock: one month; average materials in process : half a month. Credit allowed by suppliers: one month; credit allowed to debtors: two months. Time lag in payment of wages: one and a half weeks. Overheads: one month. One-fourth of sales are on cash basis. Cash balance is expected to be Rs 120,000.

You are required to prepare a statement showing the working capital needed to finance a level of activity of 70,000 units of output. You may assume that production is carried on evenly throughout the year and wages and overheads accrue similarly.

Solution:

Table 8.8: Calculation of Working Capital Needs

	Rs
A. Investment in inventory	
1. Raw material inventory: one month (30 days)	
(RMC/360) × RMCP = {(70,000 × 52)/360} × 30	303,333.33
2. Work-in-process inventory: half-a-month (15 days)	
(COP/360) × WIPCP = {(70,000 × 110.5)/360} × 15	322,291.67
3. Finished goods inventory: one month (30 days)	
(COS/360) × FGCP = {(70,000 × 110.5)/360} × 30	644,583.33
	1,270,208.33
B. Investment in debtors: two months (60 days)	
(Credit sale (cost)/360) × BDCP = {(52,500 × 110.5)/360} × 60	966,875.00

NOTES

C. Cash balance	120,000.00
D. Investment in current assets ($A + B + C$)	2,357,708.33
E. Current liabilities: deferred payment	
1. Creditors: one month (30 days)	
(Purchases of raw material/360) × PDP = {(70,000 × 52)/360} × 30	303,333.33
2. Deferred wages: 1 1/2 weeks (10 days) = {(70,000 × 19.5)/360} × 10	37,916.67
3. Deferred overheads: one month (30 days) = {(70,000 × 39)/360} × 30	227,500.00
F. Total deferred payment (spontaneous sources of working capital [E (1 + 2 + 3)]	568,750.00
G. Net working capital ($D – F$)	1,788,958.33

Problem 8.2: A firm has applied for working capital finance from a commercial bank. You are requested by the bank to prepare an estimate of the working capital requirements of the firm. You may add 10 per cent to your estimated figure to account for exigencies. The following is the firm's projected profit and loss account:

		Rs
1.	Sales	2,247,000
2.	Cost of goods sold	1,637,100
3.	Gross profit (1 – 2)	609,900
4.	Administrative expenses	149,800
5.	Selling expenses	139,100
6.	Profit before tax [3 – (4 + 5)]	321,000
7.	Tax provision	107,000
8.	Profit after tax (6 – 7)	214,000

The cost of goods sold (COGS) is calculated as follows:

		Rs
	Materials used	898,800
	Wages and other mfg. expenses	668,750
	Depreciation	251,450
		1,819,000
Less:	Stock of finished goods (10% product not yet sold)	181,900
	Cost of goods sold	1,637,100

The figures given above relate only to the goods that have been finished, and not to work in progress; goods equal to 15 per cent of the year's production (in terms of physical units) are in progress on an average requiring full material but only 40 per cent of other expenses. The firm has a policy of keeping two months consumption of material in stock.

All expenses are paid one month in arrear. Suppliers of material grant one and a half months credit; sales are 20 per cent cash while remaining sold on two months credit. 70 per cent of the income tax has to be paid in advance in quarterly instalments.

NOTES

Solution:

Table 8.9: Estimation of Working Capital

	Rs
A. Investment in inventories	
1. Raw material: 2 months	
(RMC/12) × 2 = (8,98,800/12) × 2	149,800.00
2. Work-in-process: 15% of COP (adjusted)	
= COP × 15% = (898,800 + 40% of 668,750) × 15% = 11,66,300 × 15%	174,945.00
3. Finished goods : given	
181,900 – non-cash depreciation = 181,900 – 10% of 251,450	156,755.00
	481,500.00
B. Investment in debtors: 2 months	
(Credit sale (cost)/12) × 2 = (80% cost of sales/12) × 2	
= 80% (1,637,100 – 251,450 + 149,800 + 139,100) 2/12	223,273.33
C. Cash balance	0.00
D. Investment in current assets (*A* + *B* + *C*)	704,773.33
E. Current liabilities: deferred payments:	
1. Creditors: 1½ months (Purchases/12) × 1½ = (898,800/24) × 3	112,350.00
2. Deferred wages and other manufacturing, selling and administration expenses: one month	
(668,750 + 149,800 + 139,100/12) × 1	79,804.17
F. Total current liabilities	192,154.17
G. Net working capital (*D* – *F*)	512,619.16

Notes:

1. Depreciation is a non-cash item. Therefore, it has been ignored in calculations.
2. Cost of production does not include selling and administrative expenses.
3. Profit has been ignored in calculating net working capital. Since taxes can be paid out of profits, they have also been ignored. Alternatively, advance payment taxes require additional working capital, and profits are sources of working capital.

Problem 8.3

An engineering company is considering its working capital investment for the next year. Estimated fixed assets and current liabilities for the next year are respectively Rs 2.60 crore and Rs 2.34 crore. Sales and profit before interest and taxes (PBIT) depend on current assets investment—particularly inventories and book debts. The company is examining the following alternative working capital policies:

Working Capital Policy	*Investment in Current Assets (Rs in crore)*	*Estimated Sales (Rs in crore)*	*EBIT (Rs in crore)*
Conservative	4.50	12.30	1.23
Moderate	3.90	11.50	1.15
Aggressive	2.60	10.00	1.00

You are required to calculate the following for each policy (*a*) rate of return on total assets, (*b*) net working capital position, (*c*) current ratio, and (*d*) current asset to fixed asset ratio. Also discuss the return-risk trade offs of the three policies.

Solution:

Return-risk trade-off: Rate of return on total assets is the measure of return while CA/CL ratio or net working capital position can be taken as the measure of risk. Expected return and risk are minimum under conservative policy and highest under the aggressive policy. This implies that if the firm wants to increase its profitability by reducing investment in working capital, it has to be ready to bear more risk of being unable to meet its financial obligations.

NOTES

(Rs in crore)

	Working Capital Investment Policies		
	Conservative	*Moderate*	*Aggressive*
A. Current assets (CA)	4.50	3.90	2.60
B. Fixed assets (FA)	2.60	2.60	2.60
C. Total assets (TA)	7.10	6.50	5.20
D. Current liabilities (CL)	2.34	2.34	2.34
E. Forecasted sales	12.30	11.50	10.00
F. Expected PBIT	1.23	1.15	1.00
(*i*) Rate of return (F ÷ C)	17.3%	17.7%	19.2%
(*ii*) Net working capital (A – D)	2.16	1.56	0.26
(*iii*) Current ratio (A ÷ D)	1.92	1.67	1.11
(*iv*) CA/FA	1.73	1.50	1.00

Problem 8.4

Assume that the engineering firm in Problem 8.3 has chosen the moderate working capital policy (that is, investment of Rs 3.90 crore in current assets). The company is now examining the use of long-term and short-term borrowing for financing its assets. The company will use Rs 2.50 crore of equity funds. The corporate tax rate is 35 per cent. The company is considering the following debt alternatives:

Financing policy	*Short-term Debt (Rs in cr.)*	*Long-term Debt (Rs in cr.)*
Conservative	0.54	1.12
Moderate	1.00	0.66
Aggressive	1.50	0.16

The average effective interest rate on short-term debt is 12 per cent while on long-term debt it is 16 per cent. Determine the following for each of the financing policies: (*a*) rate of return on shareholders' equity, (*b*) net working capital position, and (*c*) current ratio. Also, evaluate the return-risk trade offs of these policies. *Expected return and risk* are lowest under the conservative policy and highest under the aggressive policy. It implies that if the company wants more return it will have to incur more risk via its financing policy.

Solution:

Table 8.10: Effects of Alternative Financial Policies

	Financing Policies		
	Conservative (Rs in cr.)	*Moderate (Rs in cr.)*	*Aggressive (Rs in cr.)*
1. Current assets (CA)	3.90	3.90	3.90
2. Fixed assets (FA)	2.60	2.60	2.60
3. Total assets (TA)	6.50	6.50	6.50
4. Current liabilities	2.34	2.34	2.34
5. Short-term debt	0.54	1.00	1.50
6. Long-term debt	1.12	0.66	0.16
7. Equity capital	2.50	2.50	2.50
8. Total capital (4 + 5 + 6 + 7)	6.50	6.50	6.50
9. Forecasted sales	11.50	11.50	11.50
10. Expected EBIT	1.15	1.15	1.15
11. Interest: STD	0.06	0.12	0.18
LTD	0.18	0.11	0.03
12. Profit before tax (10 – 11)	0.91	0.92	0.94
13. Taxes, 35%	0.32	0.32	0.33

14. Profit after tax (12 – 13)	0.59	0.60	0.61
(*a*) Return on equity (14 ÷ 7)	23.7%	23.9%	24.4%
(*b*) Net working capital position [1 – (4 +5)]	1.02	0.56	0.06
(*c*) Current ratio [1 ÷ (4 + 5)]	1.35	1.17	1.02

NOTES

8.14 ANSWERS TO 'CHECK YOUR PROGRESS'

1. Gross working capital refers to the firm's total investment in current assets, while net working capital is the difference between current assets and current liabilities. The difference between current assets and current liabilities has to be financed by the firm either from long term funds or short-term bank borrowings.
2. First, the management should realise that the level of current assets should not be either excessive or inadequate. Excessive investment in working capital assets ties up funds and reduces the firm's profitability, while inadequate investment threatens solvency of the firm as the firm may not be able to meet current obligations.
3. Net working capital is the difference between current assets and current liabilities (including short-term bank borrowings). The difference is financed by permanent sources of funds. This difference constitutes a margin or buffer for maturing obligations within the operating cycle of the business. The net working capital concept also points to the fact that working capital should be financed by a judicious mix of long-term and short-term funds.
4. When the firm follows matching approach, long term financing will be used to finance fixed assets and permanent current assets and short term financing to finance temporary and variable current assets.
5. Operating cycle of a manufacturing firm is the time duration which the firm requires to acquire inventory, manufacture the goods, sell the product and collect cash. The operating cycle of a manufacturing company involves three phases: (i) Acquisition of resources including raw material, labour, power, etc; (ii) Manufacture of the product which includes conversion of raw material to semi-finished goods and then to finished goods; and (iii) Sale of the product either for cash or on credit. If credit sales are involved, then account receivables will have to be converted to cash.
6. The net operating cycle represents the difference between gross operating cycle and the deferral period of payables or the period for which creditors remain outstanding.
7. The gross operating cycle can be broken up into inventory conversion period plus debtors' conversion period. Inventory conversion period can further be broken up into raw material conversion period, work-in-process conversion period and finished goods conversion period. Finished goods conversion period is the average time taken to sell the finished goods.
8. The manufacturing cycle period is a component of operating cycle period, and means the period required to convert raw material to work-in-process and then to finished goods. Manufacturing cycle depends upon the particular product being manufactured as well as the firm's choice of technology and production policy.
9. The requirement of working capital changes over time as it is dependant upon a number of factors. However, there is a minimum level of current assets which is continuously required by a firm to continue its business operations. This permanent or fixed working capital is the minimum level of current assets required by the firm. On the other hand, the fluctuating or variable working capital is the additional working capital required to support the production and sales activities of the firm.
10. Too much of working capital would mean wastage of resources and lead to reduction in the firm's profitability. On the other hand, paucity of working capital may lead to the firm being

NOTES

unable to meet its short-term obligations. Lack of sufficient working capital may also result in the firm being unable to avail attractive sales opportunities. The firm's decision about the level of investment in current assets involves a trade-off between risk and return.

11. There are not set methods for determining working capital requirements. Some of the important determinants of working capital are the nature of the business, market and demand conditions, technology and manufacturing policy, credit policy, availability of credit from suppliers, operating efficiency and price level changes.
12. There are usually industry norms and practices regarding credit policy followed by firms in a particular line of business. However, within these parameters, a firm may adopt an aggressive or conservative policy with reference to debtors. An aggressive policy may lead to an increase in sales but an adverse experience in collection of payments, while a conservative policy may lead to lowering of sales but better payment record from debtors.
13. Various factors affecting working capital requirements are nature of business, market and demand conditions, technology and manufacturing policy, credit policy , availability of credit from suppliers , operating efficiency and price level changes.
14. The finance manager has to take care of all the components of working capital management including cash, stock, debtors and marketable securities. The levels and composition of current assets would be determined by past experience, constant interaction with the personnel involved in the manufacturing process as well as sales staff. The finance manager has to tie up the sources of funds in order to finance current assets and also monitor that current liabilities are paid in time. A certain portion of current assets has also to be financed from long term sources. As the business of the firm grows, the requirements of working capital also grow. Any emergency requirements of working capital also have to be met and contingency planning has to be in place.
15. The various aspects of working capital management, which make it an important function of the financial manager are time, investment, criticality and growth.
16. The two important aims of working capital management are profitability and solvency.
17. The best method for estimating working capital requirements is the operating cycle method. A second approach is the current assets holding period method on the basis of the firm's experience in the previous years. This approach is basically based on an operating cycle approach. A third method is the ratio of sales method wherein working capital requirement is estimated as a ratio of sales. It may be mentioned here that in the case of smaller companies, this method has been recommended by the Reserve Bank of India to commercial banks. A fourth method is the ratio of fixed investment method wherein working capital requirement is calculated as a percentage of fixed investment.
18. The main long-term sources include ordinary and preference share capital, debentures, long term borrowings from banks and financial institutions and retained earnings. The main short-term financing sources include working capital funds from banks, money market instruments like commercial paper, public deposits and factoring of receivables. Spontaneous financing represented by trade credit and outstanding expenses also support the financing of current assets.
19. There is no set formula for deciding the break-up. The 'matching approach' suggests that long term financing be used to finance fixed assets and permanent current assets, while short-term financing should be used to finance temporary or variable current assets. Overall, a firm in practice adopts a conservative approach in financing its current and fixed assets when it depends more on long-term funds for financing needs. On the other hand, an aggressive policy would be implied when a firm uses more short-term financing than suggested by the matching plan. Usually, short-tem financing is more risky but less expensive than long-term financing, and hence there is a risk-return trade-off.
20. The main sources of working capital include trade credit, accrued expenses and deferred income, bank finance and commercial paper.
21. The main forms in which bank finance for working capital are availed of by firms are overdraft facility, cash credit facility, bills purchasing/discounting facility and working capital loan.

8.15 QUESTIONS AND EXERCISES

NOTES

Review Questions

1. Explain the concept of working capital. Are gross and net concepts of working capital exclusive? Discuss.
2. What is the importance of working capital for a manufacturing firm? What shall be the repercussions if a firm has (*a*) paucity of working capital, (*b*) excess working capital?
3. What is the concept of working capital cycle? What is meant by cash conversion cycle? Why are these concepts important in working capital management? Give an example to illustrate.
4. Briefly explain factors that determine the working capital needs of a firm.
5. How is working capital affected by (*a*) sales, (*b*) technology and production policy, and (*c*) inflation? Explain.
6. Define the working capital management. Why is it important to study the management of working capital as a separate area in financial management?
7. Illustrate the profitability-solvency tangle in the current assets holding.
8. How would you determine the optimum level of current assets? Illustrate your answer.
9. Explain the costs of liquidity and illiquidity. What is the impact of these costs on the level of current assets?
10. "Merely increasing the level of current asset holding does not necessarily reduce the riskiness of the firm. Rather, the composition of current assets, whether highly liquid or highly illiquid, is the important factor to consider." Explain your position.
11. Explain the merit of a matching financing plan relative to a financing plan that extensively uses (*a*) long-term financing, or (*b*) short-term financing.
12. Explain the risk-return trade-off of current assets financing.
13. Do you recommend that a firm should finance its current assets entirely with short-term financing? Explain your answer.
14. What methods do you suggest for estimating working capital needs? Illustrate your answer.
15. Explain the importance of trade credit and accruals as sources of working capital. What is the cost of these sources?

Exercises

1. The following cost of sales statements are available for D.D. manufacturers:

Statement of Cost of Sales ***(Rs in crore)***

Items	***19X1***	***19X2***	***19X3***
1. Opening raw material inventory	5.2	6.8	7.6
2. Purchases	25.6	33.5	45.6
3. Closing raw material inventory	6.8	7.6	9.2
4. Raw material consumed (1 + 2 – 3)	24.0	32.7	44.0
5. Wages and salaries	8.1	11.2	15.3
6. Other mfg. expenses	3.2	4.4	5.8
7. Depreciation	1.8	2.0	2.6
8. Total cost (4 + 5 + 6 + 7)	37.1	50.3	67.7
9. Opening work-in-process inventory	1.8	2.0	3.1
10. Closing work-in-process inventory	2.0	3.1	4.6
11. Cost of production	36.9	49.2	66.2
12. Opening finished goods inventory	3.2	2.8	3.6
13. Closing finished goods inventory	2.8	3.6	2.9
14. Cost of goods sold	37.3	48.4	66.9
15. Selling, administrative and other expenses	1.3	1.9	2.1
16. Cost of sales (14 + 15)	38.6	50.3	69.0

NOTES

The following are the additional data available:

		19X1	19X2	19X3
Sales		45.9	60.1	82.7
PBIT		7.3	9.8	13.7
Debtors:	Opening	8.3	10.8	14.9
Closing		10.8	14.9	20.5
Creditors:	Opening	3.7	4.6	8.0
	Closing	4.6	8.0	12.0

You are required to calculate (*i*) operating cycle, (*ii*) net operating cycle, and (*iii*) cash conversion cycle for each of the three years.

2. *X* & Co. is desirous to purchase a business and has consulted you, and one point on which you are asked to advise them is the average amount of working capital which will be required in the first year's working.

   You are given the following estimates and are instructed to add 10 per cent to your computed figure to allow for contingencies:

Figures for the Year		Rs
Average amount backed up for stocks:		
Stocks of finished product		5,000
Stocks of stores, materials, etc.		8,000
Average credit given:		
Inland sales	6 weeks' credit	3,12,000
Export sales	1½ weeks' credit	78,000
Lag in payment of wages and other outgoings:		
Wages	1½ weeks	260,000
Stocks, materials, etc.	1½ weeks	48,000
Rent, royalties, etc.	6 months	10,000
Clerical staff	½ month	62,000
Manager	½ month	4,800
Miscellaneous expenses	1½ months	48,000
Payment in advance:		
Sundry expenses (paid quarterly in advance)		8,000
Undrawn profits on the average throughout the year.		11,000

   Set up your calculations for the average amount of working capital required.
   (*C.A., adapted*)

3. A *proforma* cost sheet of a company provides the following particulars:

	Amount per unit Rs
Raw material	80
Direct labour	30
Overheads	60
Total cost	170
Profit	30
Selling price	200

   The following further particulars are available:

   (*a*) Raw material in stock, on an average one month; materials in process, on average half a month; finished goods in stock, on an average one month.

   (*b*) Credit allowed by suppliers is one month; credit allowed to debtors is two months; lag in payment of wages is one and a half weeks; lag in payment of overhead expenses is one month; one-fourth of the output is sold against cash; cash in hand and at bank is expected to be Rs 25,000.

You are required to prepare a statement showing working capital needed to finance a level of activity of 104,000 units of production. You may assume that production is carried on evenly throughout the year, and wages and overheads accrue similarly. (*C.A., adapted*)

4. While preparing a project report on behalf of a client you have collected the following facts. Estimate the net working capital required for that project. Add 10 per cent to your computed figure to allow for contingencies.

	Amount per unit Rs
Estimated cost per unit of production is:	
Raw material	42.4
Direct labour	15.9
Overheads (exclusive of depreciation)	31.8
Total cost	90.1
Additional information:	
Selling price	Rs 106 per unit, 100,000 units
Level of activity	of production per annum
Raw material in stock	average 4 weeks
Work-in-progress	
(assume 50%completion stage)	average 2 weeks
Finished goods in stock	average 4 weeks
Credit allowed by suppliers	average 4 weeks
Credit allowed to debtors	average 8 weeks
Lag in payment of wages	average 1½ weeks
Cash at bank is expected to be Rs 125,000.	

You may assume that production is carried on evenly throughout the year (52 weeks) and wages and overheads accrue similarly. All sales are on credit basis only.

(*M.Com., D.U., adapted*)

5. The following are the given cost of liquidity and illiquidity for different ratios of current assets to fixed assets of a firm. Determine the optimum ratio of current assets to fixed assets. Also show your answer on a graph.

CA/FA	***Cost of Liquidity***	***Cost of Liquidity***
0.10	138,000	2,200,000
0.25	275,000	1,650,000
0.40	550,000	1,100,000
0.70	1,100,000	830,000
1.00	2,200,000	690,000
1.50	4,140,000	550,000
2.50	6,890,000	276,000

6. GG Industries have estimated its monthly needs of net working capital for 19X1 as follows:

The firm is rated to have average risk; therefore, working capital finance from a bank will cost the firm 16 per cent per annum. Long-term borrowing will be available at 14 per cent. The firm can invest excess funds in the form of inter- corporate lending at 12 per cent per annum.

(*i*) Assume the firm finances the maximum amount of its working capital requirements for the next year with long-term borrowing and investing any excess funds in the form of inter- corporate lending. Calculate GG Industries net interest cost during 19X1.

Month	***Amount Rs lakh***	***Month***	***Amount Rs lakh***
January	72.65	July	58.12
February	58.13	August	72.66
March	29.06	September	82.30
April	24.22	October	87.19
May	33.90	November	92.02
June	43.60	December	87.17

NOTES

(*ii*) Assume the firm finance all its working capital requirements for the next year with short-term borrowing. Determine GG Industries interest cost during 19X1.

(*iii*) Discuss the return-risk trade-offs associated with the above two policies.

7. A company wants to analyse the effect of its working capital investment and financing policies on shareholders' return and risk. Assume that the firm has Rs 180 crore in fixed assets and Rs 150 crore in current liabilities. The company has a policy of maintaining a debt to total assets ratio of 60 per cent, where debt consists of both short-term debt from banks and long-term debt. The following data relate to three alternative policies:

Working Capital Policies	*Investment in Current Assets (Rs crore)*	*Bank Borrowings (Rs crore)*	*Projected Sales (Rs crore)*	*EBIT (Rs crore)*
Aggressive	252	216	531	53
Moderate	270	162	540	54
Conservative	288	108	549	55

Assume that bank borrowing will cost 16 per cent while the effective interest cost of long-term borrowing will be 18 per cent per annum. You are required to determine: (*a*) return on shareholders equity, (*b*) net working capital position, (*c*) current ratio, and (*d*) current assets to total assets ratio. Also evaluate the return-risk trade offs associated with these three policies.

8. The following is the balance sheet and production plan of Neo-Pharma Ltd.

Table 8.11: Neo-Pharma Limited Balance Sheet as on June 30, 20X2

(Rs in lakh)

Liabilities			*Assets*		
Share capital		54	Fixed assets		31
Reserves		8	Investments		5
Long-term loans		4	Current assets:		
Current liabilities:			Raw materials	64	
Sundry creditors	41		Work-in-progress	7	
Other current liabilities	10		Finished goods	49	
Bank borrowings	135		Sundry debtors	91	
Provisions for tax and dividends	14	200	Outstanding exports sales 15		
			Cash and bank balances	6	
			Misc. current assets	11	
			Advance tax payment	2	230
		266			266

Notes: (*i*) Bills discounted with banks and outstanding as on June 30, 20X2 is Rs 500,000.
(*ii*) An instalment of Rs 100,000 falls due on December 31, 20X2 as a part repayment of long-term loan.

Table 8.12: Production Plan for The Year 20X2–03

(Rs in lakh)

	20X1 (Actuals)		*20X2 (Projects)*	
Sales of which export sales	50	266	75	291
Cost of production of which:		211		238
(a) Raw materials	151		173	
(b) Wages and salaries	50		55	
(c) Direct manufacturing expenses	10		10	

Gross profit	55	53
Operating expenses	44	42
Cost of sales	255	280
Non-operating income	4	3
Provision for taxation	8	8
Net profit	7	6

Table 8.13: Projected Balance Sheet as on June 30, 20X3

(Rs in lakh)

(Rs in lakh)

Liabilities			***Assets***		
Share capital		54	Fixed assets		25
Reserves		13	Investments		1
Long-term loans		3	Current assets of which:		
Current liabilities of which:			Raw materials	60	
Sundry creditors	44		Work-in-progress	17	
Other current liabilities	6		Finished goods	52	
Bank borrowings	139		Sundry debtors	98	
Provisions for tax and dividends	15	204	Outstanding exports sales 27		
			Cash and bank balances	7	
			Misc. current assets	8	
			Advance tax payment	6	248
		274			274

Notes: (*i*) Bills discounted with banks and outstanding as on June 30, 20X3, Rs 1,000,000.
(*ii*) An instalment of Rs 250,000 falls due on December 31, 20X3 as a part repayment of long-term loan.

Table 8.13: Working Capital Norms for Pharmaceutical Industry

Raw materials and others	2 ¾ months consumption
Work-in-progress	½ month's cost of production
Finished goods	2 months cost of sales
Receivables and bills purchased and discounted.	1 ¼ months of sale

You are required to calculate the maximum permissible bank finance (MPBF) as per the Tandon Committee recommendations regarding Method 1 and Method 2.

9. Ananta Chemicals Limited is considering raising of Rs 15 crore by issuing CPs for 120 days. CPs will be sold at a discount of 11.25 per cent. Stamp duty charges will be 0.5 per cent of the size of the issue. The issuing and other charges will amount to Rs 3.75 lakh and rating charges to 0.40 per cent of the issue size. Calculate the effective cost of CP.
10. XY Ltd. is planning to sell a 90-day CP of Rs 100 for Rs 94.75. The company will have to incur expenses as follows: (*a*) rating of issue: 0.35 per cent, (*b*) stamp duty 0.5 per cent, (*c*) issuing charges 0.2 per cent and (*d*) dealer's fee 0.15 per cent. What is the cost of CP?

MODULE - 3

UNIT 9 DIVIDEND THEORY

NOTES

Structure

9.0 INTRODUCTION

Dividend decision of the firm is yet another crucial area of financial management. The important aspect of dividend policy is to determine the amount of earnings to be distributed to shareholders and the amount to be retained in the firm. Retained earnings are the most significant internal sources of financing the growth of the firm. On the other hand, dividends may be considered desirable from shareholders' point of view as they tend to increase their current return. Dividends, however, constitute the use of the firm's funds.

9.1 UNIT OBJECTIVES

- Highlight the issues of dividend policy
- Critically evaluate why some experts feel that dividend policy matters
- Discuss the bird-in-the-hand argument for paying current dividends
- Explain the logic of the dividend irrelevance
- Identify the market imperfections that make dividend policy relevant

9.2 ISSUES IN DIVIDEND POLICY

In theory, the objective of a dividend policy should be to maximise a shareholder's return so that the value of his investment is maximised. Shareholders' return consists of two components: dividends and capital gains. Dividend policy has a direct influence on these two components of return.

NOTES

Let us consider an example to highlight the issues underlying the dividend policy. **Payout ratio**—which is dividend as a percentage of earnings—is an important concept vis-à-vis the dividend policy. 100 per cent minus payout percentage is called **retention ratio**. Suppose two companies, Low Payout Company and High Payout Company, both have a return on equity (ROE) of 20 per cent. Assume that both companies' equity consists of one share each of Rs 100. High Payout Company distributes 80 per cent while Low Payout Company distributes 20 per cent of its earnings as dividends. As you may recall, growth rate is the product of return on equity (ROE) times retention ratio (b):

$$\text{Growth} = \text{ROE} \times \text{Retention ratio}$$

$$g = \text{ROE} \times b$$

For Low Payout Company, the growth rate is:

$$g = 0.20 \times 0.80 = 0.16 \text{ or } 16\%$$

For High Payout Company the growth rate will be:

$$g = 0.20 \times 0.20 = 0.04 \text{ or } 4\%$$

It may be seen from Table 9.1 that High Payout's dividend is initially four times that of Low Payout's. However, over a long period of time, Low Payout overtakes High Payout's dividend payments. As shown in Figure 9.1, in our example, fourteenth year onwards Low Payout's dividend exceeds that of High Payout. Note that Low Payout retains much more than High Payout, and as a consequence, High Payout's earnings, dividends and equity investment are growing at 16 per cent while that of Low Payout's at 4 per cent only.

Table 9.1: Consequences of High and Low Payout Policies

Year	*Equity Rs*	*Earnings at 20% Rs*	*Dividends Rs*	*Retained Earnings Rs*
High Payout Company				
1	100.00	20.00	16.00	4.00
2	104.00	20.80	16.64	4.16
3	108.16	21.63	7.31	4.32
4	112.48	22.50	18.00	4.50
5	116.98	23.40	18.72	4.68
10	142.33	28.47	22.77	5.69
15	173.17	34.63	27.71	6.92
20	210.68	42.14	33.71	8.43
Low Payout Company				
1	100.00	20.00	4.00	16.00
2	116.00	23.20	4.64	18.56
3	134.56	26.91	5.38	21.53
4	156.09	31.22	6.24	24.98
5	181.07	36.21	7.24	28.97
10	380.30	76.06	15.21	60.85
15	798.75	159.75	31.95	127.80
20	1,677.65	335.53	67.11	268.42

A low payout policy might produce a higher share price because it accelerates earnings growth. Investors of growth companies will realise their return mostly in the form of **capital gains. Dividend yield**—dividend per share divided by the market price per share—will be low for such companies. The impact of dividend policy on future capital gains is, however, complex. Capital gains occur in distant future, and therefore, many people consider them uncertain. It is not sure that low-payout policy will necessarily lead to higher prices in reality. It is quite difficult to clearly identify the effect of payout on share price. Share price is a reflection of so many factors that the long-run effect of payout is quite difficult to isolate.

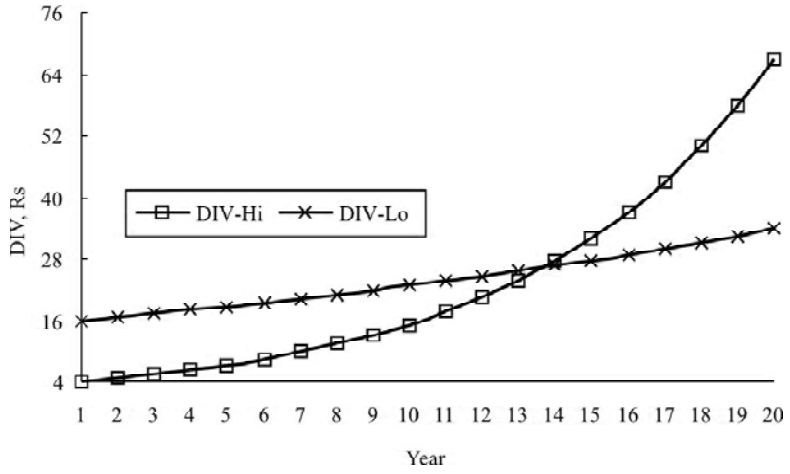


Figure 9.1: Dividend per share under high and low payout policies

A high payout policy means more current dividends and less retained earnings, which may consequently result in slower growth and *perhaps* lower market price per share. As stated earlier, low payout policy means less current dividends, more retained earnings and higher capital gains and *perhaps* higher market price per share. Capital gains are future earnings while dividends are current earnings. Dividends in most countries are taxed more than capital gains.[1] Therefore, it is quite plausible that some investors would prefer high-payout companies while others may prefer low-payout companies.

What does dividend policy imply? Paying dividends involves outflow of cash. The cash available for the payment of dividends is affected by the firm's investment and financing decisions. A decision to incur capital expenditure implies that less cash will be available for the payment of dividends. Thus, investment decision affects dividend decision. If the firm's value is affected, is it because of the investment decision or the dividend decision? Given the firm's capital expenditure, and that it does not have sufficient internal funds to pay dividends, it can raise funds by issuing new shares. In this case, the dividend decision is not separable from the firm's financing decision.

The firm will have a given amount of cash available for paying dividends given its investment and financing decisions. Thus, a dividend decision involves a trade-off between the retained earnings and issuing new shares. It is essential to separate the effect of dividend changes from the effects of investment and financing decisions. Do changes in dividend policy alone affect the value of the firm? What factors are important in formulating a dividend policy in practice?

On the relationship between dividend policy and the value of the firm, different theories have been advanced. These theories can be grouped into two categories: (*a*) theories that consider dividend decision to be irrelevant and (*b*) theories that consider dividend decision to be an active variable influencing the value of the firm. In the latter, there are two extreme views, that is: (*i*) dividends are good as they increase the shareholder value; (*ii*) dividends are bad since they reduce the shareholder value. The following is the critical evaluation of some important theories representing these points of views.

9.3 DIVIDEND RELEVANCE: WALTER'S MODEL

Professor James E. Walter argues that the choice of dividend policies almost always affect the value of the firm.[2] His model, one of the earlier theoretical works, shows the importance of the relationship between the firm's rate of return, *r*, and its cost of capital, *k*, in determining the

NOTES

Check Your Progress

1. What is the most important aspect of dividend management?

1. In India, there is no personal tax on dividends and short-term capital gains while the long-term capital gains as taxed at 10 per cent.
2. Walter, James E., Dividend Policy: Its Influence on the Value of the Enterprise, *Journal of Finance*, 18 May, 1963, p. 280–91.

NOTES

dividend policy that will maximise the wealth of shareholders. Walter's model is based on the following assumptions:[3]

- ***Internal financing*** The firm finances all investment through retained earnings; that is, debt or new equity is not issued.
- ***Constant return and cost of capital*** The firm's rate of return, *r*, and its cost of capital, *k*, are constant.
- ***100 per cent payout or retention*** All earnings are either distributed as dividends or reinvested internally immediately.
- ***Constant EPS and DIV*** Beginning earnings and dividends never change. The values of the earnings per share, EPS, and the dividend per share, DIV, may be changed in the model to determine results, but any given values of EPS or DIV are assumed to remain constant forever in determining a given value.
- ***Infinite time*** The firm has a very long or infinite life.

Walter's formula to determine the market price per share is as follows:

$$P = \frac{\text{DIV}}{k} + \frac{r(\text{EPS} - \text{DIV})/k}{k} \tag{1}$$

where P = market price per share

DIV = dividend per share

EPS = earnings per share

r = firm's rate of return (average)

k = firm's cost of capital or capitalisation rate

Equation (1) reveals that the market price per share is the sum of the present value of two sources of income: (*i*) the present value of the infinite stream of constant dividends, DIV/*k* and (*ii*) the present value of the infinite stream of capital gains, [*r* (EPS – DIV)/*k*]/*k*. When the firm retains a perpetual sum of (EPS – DIV) at *r* rate of return, its present value will be: *r* (EPS – DIV)/*k*. This quantity can be known as a capital gain which occurs when earnings are retained within the firm. If this retained earnings occur every year, the present value of an infinite number of capital gains, *r* (EPS – DIV)/*k*, will be equal to: [*r* (EPS – DIV)/*k*]/*k*. Thus, the value of a share is the present value of all dividends plus the present value of all capital gains as shown in Equation (1) which can be rewritten as follows:

$$P = \frac{\text{DIV} + (r/k)(\text{EPS} - \text{DIV})}{k} \tag{2}$$

Illustration 9.1: Dividend Policy: Application of Walter's Model

To illustrate the effect of different dividend policies on the value of share respectively for the growth firm, normal firm and declining firm Table 9.2 is constructed.

Table 9.2 shows that, in Walter's model, the optimum dividend policy depends on the relationship between the firm's rate of return, *r* and its cost of capital, *k*. Walter's view on the optimum dividend–payout ratio is explained in the next section.[4]

9.3.1 Growth Firm: Internal Rate More Than Opportunity Cost of Capital ($r > k$)

Growth firms are those firms which expand rapidly because of ample investment opportunities yielding returns higher than the opportunity cost of capital. These firms are able to reinvest earnings at a rate (*r*) which is higher than the rate expected by shareholders (*k*). They will maximise the value per share if they follow a policy of retaining all earnings for internal investment. It can be seen from Table 9.2 that the market value per share for the growth firm is maximum (i.e.,

3. Francis, Jack Clark, *Investments: Analysis and Management*, McGraw Hill, 1972, p. 344.
4. Walter, *op. cit.*, also, see Francis, *op. cit.*

Rs 150) when it retains 100 per cent earnings and minimum (i.e., Rs 100) if it distributes all earnings. Thus, the optimum payout ratio for a growth firm is zero. The market value per share *P*, increases as payout ratio declines when $r > k$.

NOTES

9.3.2 Normal Firms: Internal Rate Equals Opportunity Cost of Capital ($r = k$)

Most of the firms do not have unlimited surplus-generating investment opportunities, yielding returns higher than the opportunity cost of capital. After exhausting super profitable opportunities, these firms earn on their investments rate of return equal to the cost of capital, $r = k$. For **normal firms** with $r = k$, the dividend policy has no effect on the market value per share in Walter's model. It can be noticed from Table 9.2 that the market value per share for the normal firm is same (i.e., Rs 100) for different dividend-payout ratios. Thus, there is no unique optimum payout ratio for a normal firm. One dividend policy is as good as the other. The market value per share is not affected by the payout ratio when $r = k$.

Table 9.2: Dividend Policy and the Value of Share (Walter's Model)

Growth Firm, r > k	*Normal Firm, r = k*	*Declining Firm, r < k*
	Basic Data	
r = 0.15	r = 0.10	r = 0.08
k = 0.10	k = 0.10	k = 0.10
EPS = Rs 10	EPS = Rs 10	EPS = Rs 10
Payout Ratio 0%		
DIV = Re 0	DIV = Re 0	DIV = Re 0
P = 0 + (0.15/0.10) (10 – 0)/0.10	P = 0 + [(0.10/0.10) (10 – 0)]/0.10	P = 0 +[(0.08/0.10) (10 – 0)]/0.10
= Rs 150	= Rs 100	= Rs 80
Payout Ratio 40%		
DIV = Rs 4	DIV = Rs 4	DIV = Rs 4
P = [4 + (0.15/0.10) (10 – 4)]/0.10	P = [4 + (0.10/0.10) (10 – 4)]/0.10	P = [4 + (0.08/0.10) (10 – 4)]/0.10
= Rs 130	= Rs 100	= Rs 88
Payout Ratio 80%		
DIV = Rs 8	DIV = Rs 8	DIV = Rs 8
P = [8 + (0.15/0.10) (10 – 8)]/0.10	P = [8 + (0.10/0.10) (10 – 8)]/0.10	P = [8 + (0.08/0.10) (10 – 8)]/0.10
= Rs 110	= Rs 100	= Rs 96
Payout Ratio 100%		
DIV = Rs 10	DIV = Rs 10	DIV = Rs 10
P = [10 +(0.15/0.10)(10 – 10)]/0.10	P = [10 +(0.10/0.10)(10 – 10)]/0.10	P = [10 +(0.08/0.10) (10 – 10)]/0.10
= Rs 100	= Rs 100	= Rs 100

9.3.3 Declining Firms: Internal Rate Less Than Opportunity Cost of Capital ($r < k$)

Declining firms do not have any profitable investment opportunities to invest the earnings. These firms would earn on their investments rates of return less than the minimum rate required by investors. Investors of such firm would like earnings to be distributed to them so that they may either spend it or invest elsewhere to get a rate higher than earned by the declining firms. The market value per share of a declining firm with $r < k$ will be maximum when it does not retain earnings at all. It can be observed from Table 9.2 that, when the declining firm's payout ratio is 100 per cent (i.e., zero retained earnings) the market value per share is Rs 100 and it is Rs 80 when payout ratio is zero. Thus, the optimum payout ratio for a declining firm is 100 per cent. The market value per share, *P*, increases as payout ratio increases when $r < k$.

Thus, in Walter's model, the dividend policy of the firm depends on the availability of investment opportunities and the relationship between the firm's internal rate of return, r and its cost of capital, k. Thus:

NOTES

- Retain all earnings when $r > k$
- Distribute all earnings when $r < k$
- Dividend (or retention) policy has no effect when $r = k$.

Thus, dividend policy in Walter's model is a financing decision. When dividend policy is treated as a financing decision, the payment of cash dividends is a **passive residual**.[5]

9.3.4 Criticism of Walter's Model

Walter's model is quite useful to show the effects of dividend policy on all equity firms under different assumptions about the rate of return. However, the simplified nature of the model can lead to conclusions that are not true in general, though true for the model. The following is a critical evaluation of some of the assumptions underlying the model.

No external financing Walter's model of share valuation *mixes* dividend policy with investment policy of the firm. The model assumes that retained earnings finance the investment opportunities of the firm and no external financing—debt or equity—is used for the purpose. When such a situation exists, either the firm's investment or its dividend policy or both will be sub-optimum. This is shown graphically in Figure 9.2.[6] The horizontal axis represents the amount of earnings, investment and new financing in rupees. The vertical axis shows the rates of return and the cost of capital. It is assumed that the cost of capital, k, remains constant regardless of the amount of new capital raised.

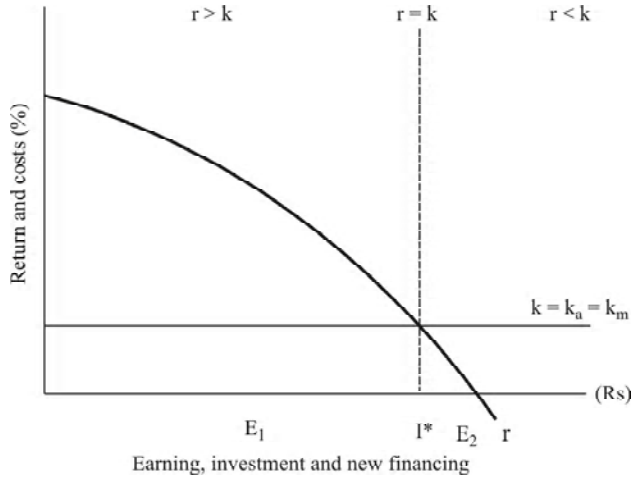


Figure 9.2

Thus, the average cost of capital k_a is equal to the marginal cost of capital, k_m. The rates of return on investment opportunities available to the firm are assumed to be decreasing. This implies that the most profitable investments will be made first and the poorer investments made last. In Figure 9.2, I^* rupees of investment occurs where $r = k$. I^* is the optimum investment regardless of whether the capital to finance this investment is raised by selling shares, debentures, retaining earnings or obtaining a loan. If the firm's earnings are E_1, then $(I^* - E_1)$ amount should be raised to finance the investments. However, external financing is not included in Walter's simplified model. Thus, for this situation Walter's model would show that the owner's wealth is maximised by retaining and investing firm's total earnings of E_1 and paying no dividends. In a more comprehensive model allowing for outside financing, the firm should raise new funds to finance I^* investment. The wealth of the owners will be maximised only when this optimum investment is made.

Constant return, r Walter's model is based on the assumption that r is constant. In fact, r decreases as more and more investment is made. This reflects the assumption that the most profitable investments are made first and then the poorer investments are made. The firm should stop at a point where $r = k$. In Figure 9.2, the optimum point of investment occurs at I^* where $r =$

5. Solomon, Ezra, *The Theory of Financial Management*, Columbia Press, 1963, pp. 139–40.
6. Francis, *op. cit.*, p. 347.

k; if the firm's earnings are E_2 it should pay dividends equal to $(E_2 - I)^*$; on the other hand, Walter's model indicates that, if the firm's earnings are E_2, they should be distributed because $r < k$ at E_2. This is clearly an erroneous policy and will fail to optimise the wealth of the owners.

Constant opportunity cost of capital, k A firm's cost of capital or discount rate, k, does not remain constant; it changes directly with the firm's risk. Thus, the present value of the firm's income moves inversely with the cost of capital. By assuming that the discount rate, k, is constant, Walter's model abstracts from the effect of risk on the value of the firm.

NOTES

9.4 DIVIDEND RELEVANCE: GORDON'S MODEL

Myron Gordon develops one very popular model explicitly relating the market value of the firm to dividend policy.[7] Gordon's model is based on the following assumptions:[8]

- ***All-equity firm*** The firm is an all-equity firm, and it has no debt.
- ***No external financing*** No external financing is available. Consequently, retained earnings would be used to finance any expansion. Thus, just as Walter's model Gordon's model too confounds dividend and investment policies.
- ***Constant return*** The internal rate of return, r, of the firm is constant. This ignores the diminishing marginal efficiency of investment as represented in Figure 9.2.
- ***Constant cost of capital*** The appropriate discount rate k for the firm remains constant. Thus, Gordon's model also ignores the effect of a change in the firm's risk-class and its effect on k.
- ***Perpetual earnings*** The firm and its stream of earnings are perpetual.
- ***No taxes*** Corporate taxes do not exist.
- ***Constant retention*** The retention ratio, b, once decided upon, is constant. Thus, the growth rate, $g = br$, is constant forever.
- ***Cost of capital greater than growth rate*** The discount rate is greater than growth rate, $k > br = g$. If this condition is not fulfilled, we cannot get a meaningful value for the share.

According to Gordon's dividend-capitalisation model, the market value of a share is equal to the present value of an infinite stream of dividends received by the shareholders. Thus:

$$P_0 = \frac{\text{DIV}_1}{(1+k)} + \frac{\text{DIV}_2}{(1+k)^2} + \cdots + \frac{\text{DIV}_\infty}{(1+k)^\infty} = \sum_{t=1}^{\infty} \frac{\text{DIV}_t}{(1+k)^t} \tag{3}$$

However, the dividend per share is expected to grow when earnings are retained. The dividend per share is equal to the payout ratio, $(1 - b)$ times earnings per share, EPS; that is, $\text{DIV}_t = (1 - b)\ \text{EPS}_t$ where b is the fraction of retained earnings. It is assumed that the retained earnings are reinvested within the all-equity firm at the firm's internal rate of return, r. This allows earnings to grow at $g = br$ per period. When we incorporate growth in earnings and dividends, resulting from the retained earnings, in the dividend-capitalisation model, the present value of a share is determined by the following formula:

$$P_0 = \frac{\text{DIV}(1+g)}{(1+k)} + \frac{\text{DIV}(1+g)^2}{(1+k)^2} + \frac{\text{DIV}(1+g)^3}{(1+k)^3} + \cdots + \frac{\text{DIV}(1+g)^\infty}{(1+k)^\infty}$$
$$= \sum_{t=1}^{\infty} \frac{\text{DIV}(1+g)^t}{(1+k)^t} \tag{4}$$

When Equation (4) is solved it becomes:

Check Your Progress

2. What are the basic assumptions of Walter model?

7. Gordon, Myron J., *The Investment, Financing and Valuation of Corporation*, Richard D. Irwin, 1962.
8. Francis, op. *cit*., p. 352.

$$P_0 = \frac{DIV_1}{k - g} \tag{5}$$

Substituting $EPS_1 (1 - b)$ for DIV_1 and br for g, Equation (5) can be rewritten as

NOTES

$$P_0 = \frac{EPS_1(1 - b)}{k - br} \tag{6}$$

Equation (6) explicitly shows the relationship of expected earnings per share, EPS_1, dividend policy as reflected by retention ratio, b, internal profitability, r, and the all-equity firm's cost of capital, k, in the determination of the value of the share. Equation (6) is particularly useful for studying the effects of dividend policy on the value of the share.

Let us consider the case of a normal firm where the internal rate of return of the firm equals its cost of capital, i.e., $r = k$. Under this situation, Equation (6) may be expressed as follows:

$$P_0 = \frac{EPS_1(1 - b)}{k - br} = \frac{rA(1 - b)}{k - br} \tag{7}$$

(since EPS = rA, A = assets per share)

If $r = k$, then

$$P_0 = \frac{EPS_1(1 - b)}{k - br} = \frac{rA(1 - b)}{k - br} = \frac{EPS}{k} = \frac{rA}{r} = A \tag{8}$$

Equation (8) shows that regardless of the firm's earnings per share, EPS_1, or risk (which determines k), the firm's value is not affected by dividend policy and is equal to the book value of assets per share. That is, when $r = k$, dividend policy is irrelevant since b, completely cancels out of Equation (8). Interpreted in economic sense, this finding implies that, under competitive conditions, the opportunity cost of capital, k, must be equal to the rate of return generally available to investors in comparable shares. This means that any funds distributed as dividends may be invested in the market at the rate equal to the firm's internal rate of return. Consequently, shareholders can neither lose nor gain by any change in the company's dividend policy, and the market value of their shares must remain unchanged.[9]

Considering the case of the declining firm where $r < k$, Equation (8) indicates that, if the retention ratio, b, is zero or payout ratio, $(1 - b)$, is 100 per cent the value of the share is equal to:

$$P_0 = \frac{rA}{k} \qquad (b = 0) \tag{9}$$

If $r < k$ then $r/k < 1$ and from Equation (9) it follows that P_0 is smaller than the firm's investment per share in assets, A. It can be shown that if the value of b increases, the value of the share continuously falls.[10] These results may be interpreted as follows:

If the internal rate of return is smaller than k, which is equal to the rate available in the market, profit retention clearly becomes undesirable from the shareholders' standpoint. Each additional rupee (sic) retained reduces the amount of funds that shareholders could invest at a higher rate elsewhere and thus further depresses the value of the company's share. Under such conditions, the company should adopt a policy of contraction and disinvestment, which would allow the owner to transfer not only the net profit but also paid in capital (or a part of it) to some other, more remunerative enterprise.[11]

Finally, let us consider the case of a growth firm where $r > k$. The value of a share will increase as the retention ratio, b, increases under the condition of $r > k$. However, it is not clear as to what the value of b should be to maximise the value of the share, P_0. For example, if $b = k/r$, Equation (6) reveals that denominator, $k - br = 0$, thus making P_0 infinitely large, and if $b = 1$, $k - br$ becomes

9. Dobrovolsky, Sergie P., *The Economics of Corporation Finance*, McGraw Hill, 1971, p. 55.
10. *Ibid*., p. 56.
11. *Ibid*.

negative, thus making P_0 negative. These absurd results are obtained because of the assumption that r and k are constant, which underlie the model. Thus, to get the meaningful value of the share, according to Equation (6), the value of b should be less than k/r. Gordon's model is illustrated in Illustration 9.2.

NOTES

Illustration 9.2 : Application of Gordon's Dividend Model

Let us consider the data in Table 9.3 on the next page. The implications of dividend policy, according to Gordon's model, are shown respectively for the growth, the normal and the declining firms.

It is revealed that under Gordon's model:

- The market value of the share, P_0, increases with the retention ratio, b, for firms with growth opportunities, i.e. when $r > k$.
- The market value of the share, P_0, increases with the payout ratio, $(1 - b)$, for declining firms with $r < k$.
- The market value of the share is not affected by dividend policy when $r = k$.

Gordon's model's conclusions about dividend policy are similar to that of Walter's model. This similarity is due to the similarities of assumptions that underlie both the models. Thus the Gordon model suffers from the same limitations as the Walter model.

9.5 DIVIDENDS AND UNCERTAINTY: THE BIRD-IN-THE-HAND ARGUMENT

According to Gordon's model, dividend policy is irrelevant where $r = k$, when all other assumptions are held valid. But when the simplifying assumptions are modified to conform more closely to reality, Gordon concludes that dividend policy *does affect* the value of a share even when $r = k$. This view is based on the assumption that under conditions of uncertainty, investors tend to discount distant dividends (capital gains) at a higher rate than they discount near dividends. Investors, behaving rationally, are risk-averse and, therefore, have a preference for near dividends to future dividends. The logic underlying the *dividend effect* on the share value can be described as the **bird-in-the-hand argument**. Kirshman, first of all, put forward the bird-in-the-hand argument in the following words:

Table 9.3: Dividend Policy and the Value of the Firm

Growth Firm, r > k	*Normal Firm, r = k*	*Declining Firm, r < k*
	Basic Data	
$r = 0.15$ $k = 0.10$ EPS_1 = Rs 10	$r = 0.10$ $k = 0.10$ EPS_1 = Rs 10	$r = 0.08$ $k = 0.10$ EPS_1 = Rs 10
Payout Ratio 40%		
$g = br = 0.6 \times 0.15 = 0.09$ $P = \frac{10(1-0.6)}{0.10-0.09}$ $= \frac{4}{0.01} = \text{Rs}\,400$	$g = br = 0.6 \times 0.10 = 0.06$ $P = \frac{10(1-0.6)}{0.10-0.06}$ $= \frac{4}{0.04} = \text{Rs}\,100$	$g = br = 0.6 \times 0.08 = 0.048$ $P = \frac{10(1-0.6)}{0.10-0.048}$ $= \frac{4}{0.052} = \text{Rs}\,77$
Payout Ratio 60%		
$g = br = 0.4 \times 0.15 = 0.06$ $P = \frac{10(1-0.4)}{0.10-0.06}$ $= \frac{6}{0.04} = \text{Rs}\,150$	$g = br = 0.4 \times 0.10 = 0.04$ $P = \frac{10(1-0.4)}{0.10-0.04}$ $= \frac{6}{0.06} = \text{Rs}\,100$	$g = br = 0.4 \times 0.08 = 0.032$ $P = \frac{10(1-0.4)}{0.10-0.032}$ $= \frac{6}{0.068} = \text{Rs}\,88$

NOTES

Payout Ratio 90%

$g = br = 0.10 \times 0.15 = 0.015$	$g = br = 0.10 \times 0.10 = 0.01$	$g = br = 0.10 \times 0.08 = 0.008$
$P = \frac{10(1-0.1)}{0.10-0.015}$	$P = \frac{10(1-0.1)}{0.10-0.01}$	$P = \frac{10(1-0.1)}{0.10-0.008}$
$= \frac{9}{0.085} = \text{Rs}\,106$	$= \frac{9}{0.09} = \text{Rs}\,100$	$= \frac{9}{0.092} = \text{Rs}\,98$

Of two stocks with identical earnings record, and prospects but the one paying a larger dividend than the other, the former will undoubtedly command a higher price merely because stockholders prefer present to future values. Myopic vision plays a part in the price-making process. Stockholders often act upon the principle that a bird in the hand is worth two in the bush and for this reason are willing to pay a premium for the stock with the higher dividend rate, just as they discount the one with the lower rate.[12]

Graham and Dodd also hold a similar view when they state:

The typical investor would most certainly prefer to have his dividend today and let tomorrow take care of itself. No instances are on record in which the withholding of dividends for the sake of future profits has been hailed with such enthusiasm as to advance the price of the stock. The direct opposite has invariably been true. ***Given two companies in the same general position and with the same earning power, the one paying the larger dividend will always sell at a higher price.***[13] (Emphasis added)

Myron Gordon has expressed the bird-in-the-hand argument more convincingly and in formal terms. According to him, uncertainty increases with futurity; that is, the further one looks into the future, the more uncertain dividends become. Accordingly, when dividend policy is considered in the context of uncertainty, the appropriate discount rate, k, cannot be assumed to be constant. In fact, it increases with uncertainty; investors prefer to avoid uncertainty and would be willing to pay higher price for the share that pays the greater current dividend, all other things held constant. In other words, the appropriate discount rate would increase with the retention rate as shown in Figure 9.2. Thus, distant dividends would be discounted at a higher rate than near dividends. Symbolically, $k_t > k_{t-1}$ for $t = 1, 2, 3, \ldots$ because of increasing uncertainty in the future. As the discount rate increases with the length of time, a low dividend payment in the beginning will tend to lower the value of share in future.

When the discount rate is assumed to be increasing, Equation (3) can be rewritten as follows:

$$P_0 = \frac{\text{DIV}_1}{(1+k_1)} + \frac{\text{DIV}_2}{(1+k_2)^2} + \frac{\text{DIV}_3}{(1+k_3)^3} + \cdots + \frac{\text{DIV}_n}{(1+k_n)^n}$$

$$= \sum_{t=1}^{\infty} \frac{\text{DIV}_t}{(1+k_t)^t} \qquad (10)$$

where P_0 is the price of the share when the retention rate, b, is zero and $k_t > k_{t-1}$. If the firm is assumed to retain a fraction b of earnings, dividend per share will be equal to $(1 - b)\,\text{EPS}_1$ in the first year. Thus, the dividend per share is expected to grow at rate $g = br$, when retained earnings are reinvested at r rate of return. The dividend in the second year will be $\text{DIV}_0 (1 + g)^2 = (1 - b)\,\text{EPS}_1 (1 + br)^2$, in the third year $\text{DIV}_0 (1 + g)^3 = (1 + b)\,\text{EPS}_2 (1 + br)^3$ and so on. Discounting this stream of dividends at the corresponding discount rates of k_1, k_2… we obtain the following equation:

$$P_b = \frac{\text{DIV}_0(1+g)^1}{(1+k_1)^1} + \frac{\text{DIV}_0(1+g)^2}{(1+k_2)^2} + \cdots + \frac{\text{DIV}_0(1+g)^n}{(1+k_n)^n} \qquad (11)$$

where P_b is the price of the share when the retention rate b is positive i.e., $b > 0$. The value of P_b

12. Krishman, John, E., *Principles of Investment*. McGraw Hill, 1933, p. 737; cf. in Mao, J.C.T., *Quantitative Analysis of Financial Decision*, Macmillan, 1969.
13. Graham, Benjamin and David L. Dodd, *Security Analysis.*; McGraw Hill, Inc., 1st ed., 1934, p. 327.

calculated in this way can be determined by discounting this dividend stream at the uniform rate, k', which is the weighted average of k_t:[14]

$$P_b = \frac{\text{DIV}_0(1+g)}{(1+k')} + \frac{\text{DIV}_0(1+g)^2}{(1+k')^2} + \cdots + \frac{\text{DIV}_0(1+g)^n}{(1+k')^n}$$
$$= \frac{\text{DIV}_1}{k'-g} = \frac{(1-b)\text{EPS}_1}{k'-br} \quad (12)$$

NOTES

Assuming that the firm's rate of return equals the discount rate, will P_b be higher or lower than P_0? Gordon's view, as explained above, is that the *increase* in earnings retention will result in a lower value of share. To emphasise, he reached this conclusion through two assumptions regarding investors' behaviour: (*i*) investors are risk averters and (*ii*) they consider distant dividends as less certain than near dividends. On the basis of these assumptions, Gordon concludes that the rate at which an investor discounts dividend stream increases with the futurity of this dividend stream. If investors discount distant dividend at a higher rate than near dividends, increasing the retention ratio has the effect of raising the average discount rate, k', or equivalently lowering share prices.

Thus, incorporating uncertainty into his model, Gordon concludes that dividend policy affects the value of the share. His reformulation of the model justifies the behaviour of investors who value a rupee of dividend income more than a rupee of capital gains income. These investors prefer dividend above capital gains because dividends are easier to predict, are less uncertain and less risky, and are therefore, discounted with a lower discount rate.[15] However, all do not agree with this view.

9.6 DIVIDEND IRRELEVANCE: THE MILLER-MODIGLIANI (MM) HYPOTHESIS

According to Miller and Modigliani (MM), under a perfect market situation, the dividend policy of a firm is irrelevant, as it does not affect the value of the firm.[16] They argue that the value of the firm depends on the firm's earnings that result from its investment policy. Thus, when investment decision of the firm is given, dividend decision—the split of earnings between dividends and retained earnings—is of no significance in determining the value of the firm.

A firm, operating in perfect capital market conditions, may face one of the following three situations regarding the payment of dividends:

- The firm has sufficient cash to pay dividends.
- The firm does not have sufficient cash to pay dividends, and therefore, it issues new shares to finance the payment of dividends.
- The firm does not pay dividends, but a shareholder needs cash.

In the first situation, when the firm pays dividends, shareholders get cash in their hands, but the firm's assets reduce (its cash balance declines). What shareholders gain in the form of cash dividends, they lose in the form of their claims on the (reduced) assets. Thus, there is a transfer of wealth from shareholders' one pocket to their another pocket. There is no net gain or loss. Since it is a fair transaction under perfect capital market conditions, the value of the firm will remain unaffected.

In the second situation, when the firm issues new shares to finance the payment of dividends, two transactions take place. First, the existing shareholders get cash in the form of dividends, but they suffer an equal amount of capital loss since the value of their claim on assets reduces. Thus,

14. Mao, James C.T., *Quantitative Analysis of Financial Decision*, Macmillan, 1969, p. 482.
15. Francis, *op. cit.*, p. 354.
16. Miller, Merton H. and Modigliani, France, Dividend Policy, Growth and Valuation of the Shares, *Journal of Business*, XXIV (October 1961), pp. 411–33.

NOTES

the wealth of shareholders does not change. Second, the new shareholders part with their cash to the company in exchange for new shares at a **fair price per share**. The fair price per share is share price before the payment of dividends less dividend per share to the existing shareholders. The existing shareholders transfer a part of their claim (in the form of new shares) to the new shareholders in exchange for cash. There is no net gain or loss. Both transactions are fair, and thus, the value of the firm will remain unaltered after these transactions.

In the third situation, if the firm does not pay any dividend a shareholder can create a "**home-made dividend**" by selling a part of his/her shares at the market (fair) price in the capital market for obtaining cash. The shareholder will have less number of shares. He or she has exchanged a part of his claim on the firm to a new shareholder for cash. The net effect is the same as in the case of the second situation. The transaction is a fair transaction, and no one loses or gains. The value of the firm remains the same, before or after these transactions. Consider an example.

Illustration 9.3: Dividend Irrelevance: The Miller-Modigliani Hypothesis

The Himgir Company Limited currently has 2 crore outstanding shares selling at a market price of Rs 100 per share. The firm has no borrowing. It has internal funds available to make a capital expenditure (capex) of Rs 30 crore. The capex is expected to yield a positive net present value of Rs 20 crore. The firm also wants to pay a dividend per share of Rs 15. Given the firm's capex plan and its policy of zero borrowing, the firm will have to issue new shares to finance payment of dividends to its shareholders. How will the firm's value be affected (i) if it does not pay any dividend; (ii) if it pays dividend per share Rs 15?

The firm's current value is: 2×100 = Rs 200 crore. After the capex, the value will increase to: 200 + 20 = Rs 220 crore. If the firm does not pay dividends, the value per share will be: 220/2 = Rs 110.

If the firm pays a dividend of Rs 15 per share, it will entirely utilise its internal funds (15×2 = Rs 30 crore), and it will have to raise Rs 30 crore by issuing new shares to undertake capex. The value of a share after paying dividend will be: 110 – 15 = Rs 95. Thus, the existing shareholders get cash of Rs 15 per share in the form of dividends, but incur a capital loss of Rs 15 in the form of reduced share value. They neither gain nor lose. The firm will have to issue: 30 crore/95 = 31,57,895 (about 31.6 lakh) shares to raise Rs 30 crore. The firm now has 2.316 crore shares at Rs 95 each share. Thus, the value of the firm remains as: 2.316×95 = Rs 220 crore.

The crux of the MM dividend hypothesis, as explained above, is that shareholders do not necessarily depend on dividends for obtaining cash. In the absence of taxes, flotation costs and difficulties in selling shares, they can get cash by devising "home-made dividend" without any dilution in their wealth. Therefore, firms paying high dividends (i.e. high-payout firms), need not command higher prices for their shares. A formal explanation of the MM hypothesis is given in the following pages.

MM's hypothesis of irrelevance is based on the following assumptions:[17]

- ***Perfect capital markets*** The firm operates in perfect capital markets where investors behave rationally, information is freely available to all and transactions and flotation costs do not exist. Perfect capital markets also imply that no investor is large enough to affect the market price of a share.
- ***No taxes*** Taxes do not exist; or there are no differences in the tax rates applicable to capital gains and dividends. This means that investors value a rupee of dividend as much as a rupee of capital gains.
- ***Investment policy*** The firm has a fixed investment policy.
- ***No risk*** Risk of uncertainty does not exist. That is, investors are able to forecast future prices and dividends with certainty, and one discount rate is appropriate for all securities and all time periods. Thus, $r = k = k_t$ for all t.

Under the MM assumptions, r will be equal to the discount rate, k and identical for all shares. As a result, the price of each share must adjust so that the rate of return, which is composed of the rate of dividends and capital gains, on every share will be equal to the discount rate and be identical for all shares. Thus, the rate of return for a share held for one year may be calculated as follows:

17. Francis, *op. cit.*

$$r = \frac{\text{Dividends + Capital gains (or loss)}}{\text{Share price}}$$

$$r = \frac{\text{DIV} + (P_1 - P_0)}{P_0} \quad (13)$$

NOTES

where P_0 is the market or purchase price per share at time 0, P_1 is the market price per share at time 1 and DIV_1 is dividend per share at time 1. As hypothesised by MM, r should be equal for all shares. If it is not so, the low-return yielding shares will be sold by investors who will purchase the high-return yielding shares. This process will tend to reduce the price of the low-return shares and increase the prices of the high-return shares. This **switching or arbitrage** will continue until the differentials in rates of return are eliminated. The discount rate will also be equal for all firms under the MM assumptions since there are no risk differences.

From MM's fundamental principle of valuation described by Equation (13), we can derive their valuation model as follows:

$$r = \frac{\text{DIV}_1 + (P_1 - P_0)}{P_0}$$

$$P_0 = \frac{\text{DIV}_1 + P_1}{(1+r)} = \frac{\text{DIV}_1 + P_1}{(1+k)} \quad (14)$$

since $r = k$ in the assumed world of certainty and perfect markets. Multiplying both sides of Equation (14) by the number of shares outstanding, n, we obtain the total value of the firm if no new financing exists:

$$V = nP_0 = \frac{n(\text{DIV}_1 + P_1)}{(1+k)} \quad (15)$$

If the firm sells m number of new shares at time 1 at a price of P_1, the value of the firm at time 0 will be:

$$nP_0 = \frac{n(\text{DIV}_1 + P_1) + mP_1 - mP_1}{(1+k)}$$

$$= \frac{n\text{DIV}_1 + nP_1 + mP_1 - mP_1}{(1+k)}$$

$$= \frac{n\text{DIV}_1 + (n+m)P_1 - mP_1}{(1+k)} \quad (16)$$

MM's valuation Equation (16) allows for the issue of new shares, unlike Walter's and Gordon's models. Consequently, a firm can pay dividends and raise funds to undertake the optimum investment policy (as explained in Figure 9.1). Thus, dividend and investment policies are not confounded in the MM model, like Walter's and Gordon's models. As such, MM's model yields more general conclusions.

The investment programmes of a firm, in a given period of time, can be financed either by retained earnings or the issue of new shares or both. Thus, the amount of new shares issued will be:

$$mP_1 = I_1 - (X_1 - n\text{DIV}_1) = I_1 - X_1 + n\text{DIV}_1 \quad (17)$$

where I_1 represents the total amount of investment during first period and X_1 is the total net profit of the firm during first period.

By substituting Equation (17) into Equation (16), MM showed that the value of the firm is unaffected by its dividend policy, Thus,

$$nP_0 = \frac{n\text{DIV}_1 + (n+m)P_1 - mP_1}{(1+k)}$$

$$= \frac{n\text{DIV}_1 + (n+m)P_1 - (I_1 - X_1 + n\text{DIV}_1)}{(1+k)}$$

$$= \frac{(n+m)P_1 - I_1 + X_1}{(1+k)}$$

NOTES

A firm which pays dividends will have to raise funds externally to finance its investment plans. MM's argument, that dividend policy does not affect the wealth of the shareholders, implies that when the firm pays dividends, its advantage is offset by external financing. This means that the terminal value of the share (say, price of the share at first period if the holding period is one year) declines when dividends are paid. Thus, the wealth of the shareholders—dividends plus terminal price—remains unchanged. As a result, the present value per share after dividends and external financing is equal to the present value per share before the payment of dividends. Thus, the shareholders are indifferent between payment of dividends and retention of earnings.

Illustration 9.4 : Dividend Policy with and without Issue of Shares

The Vikas Engineering Co. Ltd., currently has one lakh outstanding shares selling at Rs 100 each. The firm has net profits of Rs 10 lakh and wants to make new investments of Rs 20 lakh during the period. The firm is also thinking of declaring a dividend of Rs 5 per share at the end of the current fiscal year. The firm's opportunity cost of capital is 10 per cent. What will be the price of the share at the end of the year if (*i*) a dividend is not declared; (*ii*) a dividend is declared. (*iii*) How many new shares must be issued?

The price of the share at the end of the current fiscal year is determined as follows:

$$P_0 = \frac{\text{DIV}_1 + P_1}{(1+k)}$$

$$P_1 = P_0(1+k) - \text{DIV}_1$$

The value of P_1 when dividend is not paid is:

$$P_1 = \text{Rs}100(1.10) - 0 = \text{Rs}110$$

The value of P_1 when dividend is paid is:

$$P_1 = \text{Rs}100(1.10) - \text{Rs}5 = \text{Rs}105$$

It can be observed that whether dividend is paid or not the wealth of shareholders remains the same. When the dividend is not paid the shareholder will get Rs 110 by way of the price per share at the end of the current fiscal year. On the other hand, when dividend is paid, the shareholder will realise Rs 105 by way of the price per share at the end of the current fiscal year *plus* Rs *5* as dividend.

The number of new shares to be issued by the company to finance its investments is determined as follows:

$$mP_1 = I - (X - n\text{DIV}_1)$$

$$105m = 2,000,000 - (1,000,000 - 500,000)$$

$$105m = 1,500,000$$

$$m = 1,500,000/105 = 14,285 \text{ shares.}$$

9.7 RELEVANCE OF DIVIDEND POLICY UNDER MARKET IMPERFECTIONS

The MM hypothesis of dividend irrelevance is based on simplifying assumptions as discussed in the preceding section. Under these assumptions, the conclusion derived by them is logically consistent and intuitively appealing. But the assumptions underlying MM's hypothesis may not always be found valid in practice. For example, we may not find capital markets to be perfect in reality; there may exist issue costs; dividends may be taxed differently than capital gains; investors may encounter difficulties in selling their shares. Because of the unrealistic nature of the assumptions, MM's hypothesis is alleged to lack practical relevance. This suggests that internal financing and external financing are not equivalent. Dividend policy of the firm may affect the perception of shareholders and, therefore, they may not remain indifferent between dividends and capital gains. The following are the situations where the MM hypothesis may go wrong.

Check Your Progress

3. What is meant by arbitrage?
4. What does MM hypothesis holds?

9.7.1 Uncertainty and Shareholders' Preference for Dividends

Many believe that dividends are relevant under conditions of **uncertainty**. It is suggested that dividends resolve uncertainty in the minds of investors and, therefore, they prefer dividends

than capital gains. As explained earlier, Gordon and others have referred to the argument that dividends are relevant under uncertainty as the bird-in-the-hand argument. Gordon asserts that uncertainty increases with the length of time period. Investors are risk-averters and, therefore, prefer near dividends to future dividends. Thus, future dividends are discounted at a higher rate than near dividends. This implies that the discount rate increases with uncertainty. As a result, a firm paying dividends earlier will command a higher value than a firm which follows a policy of retention. This view implies that there exists a **high-payout clientele** who value shares of dividend paying more than those which do not pay dividends.

The uncertainty argument is not very convincing. MM argue that, even if the assumption of perfect certainty is dropped from their hypothesis, dividend policy continues to be irrelevant. They contend that the market prices of two firms with identical investment and capital structure policies and risk, cannot be different because they follow different dividend policies. These firms will have the same cash flows from their investments despite the differences in dividend policies.The risk (uncertainty) of the firms' shareholders is alike, given the similarities of their risk and investment and capital structure policies. Dividend policy does not change the amount and risk of cash flows from investments; it simply splits these cash flows into dividend payments and retained earnings.

The current receipt of money in the form of dividends is considered safer than the uncertain potential gain in the future. The reason for this safety is that it is cash in hand rather than that it is dividend income and not a capital gain. The shareholders can sell some of their shares to obtain current cash if a firm does not distribute dividends. The risk-return trade-off will make shareholders to expect lower returns from those firms that have high-payout ratios. Let us emphasise again that given a firm's investment and capital structure policies, paying dividends does not affect the firm's or shareholders' risk. Thus the difference between current dividends and the future capital gains does not alter the firm's value under the efficient market conditions. However, there may still exist a high-payout clientele, not because current dividends safer, but because some shareholders need a **steady source of income**, or because some will prefer to receive dividends as early as possible since some firms do not provide reliable information about their investments and earnings.

Yet another reason for shareholders preferring current dividends maybe their desire to diversify their portfolios according to their risk preferences. Hence, they would like firms to distribute earnings. They will be able to invest dividends received in other assets keeping in mind their need for **diversification**. Under these circumstances, investors may discount the value of the firms that use internal financing.

9.7.2 Transaction Costs and the Case against Dividend Payments

MM argue that internal financing (retained earnings) and external financing (issue of shares) are equivalent. This implies that when firms pay dividends, they can finance their investment plans by issuing shares. Whether the firm retains earnings or issues new shares, the wealth of shareholders would remain unaffected. This cannot be true since the issue of shares involve **flotation** or **issue costs**, including costs of preparing and issuing prospectus, underwriting fee, brokers' commission etc. No flotation costs are involved if the earnings are retained. The presence of flotation or **transaction costs** makes the external financing costlier than the internal financing via retained earnings. Thus, if flotation costs are considered, the equivalence between retained earnings and new share capital is disturbed and the retention of earnings would be favoured over the payment of dividends. In practice, dividend decisions seem to be sticky for whatever reasons. Companies continue paying same dividends, rather increasing it, unless earnings decline, in spite of need for funds.

Under the MM hypothesis, the wealth of a shareholder will be same whether the firm pays dividends or not. If a shareholder is not paid dividends and she desires to have current income, she can sell the shares held by her. When the shareholder sells her shares to satisfy her desire for current income, she will have to pay brokerage fee. This fee is more for small sales. Further, it is inconvenient to sell the shares, particularly for investors with small share holdings. Some emerging markets are not very liquid, and many shares are not frequently traded. Because of the transactions

NOTES

costs and inconvenience associated with the sale of shares to realise capital gains, shareholders may prefer dividends to capital gains.

9.7.3 Information Asymmetry and Agency Costs and the Case for Dividend Payments

Managers in practice may not share complete information with shareholders. This gap between information available with managers and what is actually shared with shareholders is called **information asymmetry**. This leads to several agency problems, viz., conflicts between managers and shareholders. Managers may not have enough incentive to disclose full information to shareholders. They may act in their own self-interest and take away the firm's wealth in the form of non-pecuniary benefits. Shareholders incur agency costs to obtain full information about a company's investment plans, future earnings, expected dividend payments etc. The shareholders-managers conflict can be reduced through monitoring which includes bonding contracts and limiting the power of managers vis-à-vis allocation of wealth and managerial compensation.[18] However, monitoring involves costs that are referred to as agency costs. Payment of dividend allocates resources to shareholders, and thus, alleviates the need for monitoring and incurring agency costs.

The high-payout policy of a company helps to reduce the conflict arising out of information asymmetry.[19] It is argued that companies which pay high dividends regularly may be raising capital more frequently from the primary markets. Therefore, the actors in primary markets like the financial institutions and banks would be monitoring the performance of these companies. If the professionals in the banks and financial institutions continuously do such monitoring, shareholders need not incur monitoring (agency) costs.

Dividend payout also allocates financial resources in favour of shareholders as against lenders. Lenders have prior claims over a company's cash flows generated internally. The payment of dividend changes this priority in favour of shareholders as they receive cash flows before the loan principals of lenders are redeemed. Thus, we observe that from the point of view of agency costs, shareholders would generally prefer payment of dividend.

9.7.4 Tax Differential: Low-Payout and High-Payout Clientele

MM's assumption that taxes do not exist is far from reality. Investors have to pay taxes on dividends and capital gains. But different tax rates are applicable to dividends and capital gains. Dividend income is generally treated as the ordinary income, while capital gains are specially treated for tax purposes. In most countries, the capital gains tax rate is lower than the marginal tax rate for ordinary income. From the tax point of view, a shareholder in high tax bracket should prefer capital gains over current dividends for two reasons: (*i*) the capital gains tax is less than the tax on dividends, and (*ii*) the capital gains tax is payable only when the shares are actually sold. The effect of the favourable tax differential in case of capital gains will result in tax savings. As a consequence, the value of the share should be higher in the internal financing case than in the external financing one. Thus, the tax advantage of capital gains over dividends strongly favours a low-dividend payout policy. This implies that investors will pay more for low-dividend yield shares. Tax differential should attract **tax clienteles**. Investors in high-tax brackets should own low-payout shares, and those in low-tax bracket should own high-payout shares. In reality, most investors may have marginal income tax rate higher than the capital gains tax rate. Thus, dividends, on an average, are considered bad since they will result in higher taxes and reduction in the wealth of shareholders. Tax differential generally favour **low-payout clientele.**

Consider an example. Two identical firms *X* and *Y* have different dividend policy. Both have after tax profit, *P* of Rs 100. *X* pays 100 per cent dividend. *Y* does not pay any dividend and shareholders

18. Jensen, M.C. and Meckling, W.H., Theory of the Firm: Managerial Behaviour, Agency Costs and Ownership Structure, *Journal of Financial Economics*, October 1976.
19. Rozeff, M., Growth, Beta and Agency Cost as Determinants of Dividend Payout Ratios, *Journal of Financial Research*, Fall 1982, pp. 249–59.

get capital gains. Assume further that capital gains from shares held at least for one year are taxed at 20 per cent and marginal income tax rate is 40 per cent. Suppose *Y*'s shareholders are in highest tax bracket and pay tax on dividend income at 40 per cent. *X*'s shareholders will receive dividends of Rs 100 and their after tax dividend income will be: $100 \times (1 - 0.40) = \text{Rs } 60$. *Y*'s shareholders will realize capital gains of Rs 100 and their after tax capital gains will be: $100 \times (1 - 0.20) = \text{Rs } 80$. *Y*'s shareholders are better off as they have tax advantage. Since the after tax equity income of *Y*'s shareholders is higher than *X*'s shareholders and since both firms are identical in all other respects, *Y*'s equity price will be higher. To match capital gain of Re 1 of *Y*'s shareholders, *X*'s shareholders should receive dividend of Rs 1.33:

$$\text{After-tax dividend} = \text{After-tax capital gain}$$
$$(1 - 0.40)\,\text{DIV} = (1 - 0.20)$$
$$\text{DIV} = 0.80/0.60 = 1.33$$

If *X*'s shareholders get dividend of Rs 1.33 and *Y*'s shareholders get capital gain of Rs 1, both will have after tax income of Rs 0.80.

If a tax system favours capital gains to dividend income, there may still be several investors who are in lower tax brackets. These investors investing in shares will prefer dividend income rather capital gains. Thus, there may exit **high-payout clientele**. In a tax system that treats dividends more favourably than capital gains, shareholders in high tax brackets will also prefer receiving dividends rather than capital gains. Under this tax system, dividends will be considered good and it will generally attract **high-payout clientele**. This situation prevails currently in India. There is no tax on dividend income in the hands of shareholders (both individuals and companies), but companies are required to pay tax at 12.5 per cent on dividends paid to shareholders. Capital gains are taxed at 20 per cent. As a result of this system, shareholders in India will prefer to receive current dividends rather than capital gains. Since companies paying dividends are required to pay additional tax, this taxation system may create a conflict between shareholders and companies. Companies would like to pay no or low dividends to save additional tax while shareholders would like to have more dividends as they have no tax liability on the dividend income. If the objective of the companies is to maximise the wealth of shareholders, the tax system augurs for paying higher dividends.

India is an exception where dividends are not taxed but capital gains are. In most countries, tax systems favour capital gains with no or low tax rates as compared to dividends. Thus, the preference for low-payout or high-payout shares will depend on the tax status of the individual investors. (See Exhibit 9.1 for the different tax systems regarding dividends and capital gains.)

9.7.5 Neutrality of Dividend Policy: The Black-Scholes Hypothesis

We have just explained that the benefits of dividends for shareholders are that they satisfy their desire for current income, avoid the need to sell shares and incur transaction costs and signal the firm's prospects and risk allowing them to make choices with regard to their investment portfolios. The cost of dividends is the higher tax on dividend. Black and Scholes argue that shareholders trade off the benefits of dividends against the tax loss. Based on the trade offs that shareholders make, they could be classified into three clienteles: (*i*) a clientele that considers dividends are always good; (*ii*) a clientele that considers dividends are always bad; and (*iii*) a clientele that is indifferent to dividends. Shareholders in high tax brackets may belong to high-payout clientele since in their case the tax disadvantage may outweigh the benefits of dividends. On the other hand, shareholders in low tax brackets may fit in to low-payout clientele as they may suffer marginal tax disadvantage of dividends. Tax-exempt investors are indifferent between dividends and capital gains, as they pay no taxes on their income.

In a real world situation, all three clienteles exist as tax status and need for current incomes of investors differ. There are several hundreds of companies that 'supply' dividends to meet the demand of the three types of clienteles. Black and Scholes argue that since the supply of dividends and demand for dividends match, there will be no gains if a firm changes its dividend policy; the investors have already made their choices or there already exist opportunities for shareholders to shift from one firm to another. How will companies determine whether change in dividend policy

NOTES

EXHIBIT 7.1: TAXES AND DIVIDENDS

Shareholders' earnings are taxed differently in different countries. We can identify the following four tax systems regarding the taxation of shareholders' earnings:

- ***Double taxation:*** Under this system, shareholders' earnings are taxed twice; first the corporate tax is levied on profits at the level of the company, and then, the after-tax profits distributed as dividends are taxed as ordinary income in the hands of shareholders. Most countries have a higher marginal tax rate for dividend income than capital gains. The wealthy shareholders with high personal tax rates will prefer capital gains to dividends. A number of countries such as USA follow the double (or two-tier) taxation system. India practised this system until the change in the tax laws in 1997.
- ***Single taxation:*** Under this system, shareholders' earnings are taxed only once at the corporate level. Dividends received by shareholders are exempt from tax. India currently follows this system. Companies in India pay tax on their profits at 35 per cent, and they will have to pay additional tax at 12.5 per cent on the after-tax profits distributed as dividends to shareholders. Shareholders, both individuals and corporate, do not pay taxes on the dividend income. However, they do pay tax on short-term capital gains. The marginal personal rate is 30 per cent and short-term capital gain tax rate is 10 per cent. Under this system, all investors will prefer dividends and long-term capital gains
- ***Split-rate taxation:*** Under this system, corporate profits are divided into retained earnings and dividends for the purpose of taxation. A higher tax rate is applied to retained earnings and a lower rate to earnings distributed as dividends. Shareholders pay tax on dividends and capital gains. This system, but for a lower tax rate on dividend, is similar to double taxation system. Tax-exempt and low-tax paying shareholders would prefer dividends while shareholders in high tax brackets will prefer capital gains.
- ***Imputation taxation:*** Under this system, shareholders' earnings are not subjected to double taxation. A company pays corporate tax on its earnings. Shareholders pay personal taxes on dividends but get full or partial tax relief for the tax paid by the company. In Australia, shareholders get full tax relief while in Canada they get partial relief. Under full tax relief, a tax-exempt shareholder or a shareholder, who has a personal tax rate lower than the corporate tax rate, will get a tax refund.

will affect their share prices? This is an empirical question and a difficult question to answer, given the problems with statistical techniques. However, the Black-Scholes hypothesis shows that the tax disadvantage of dividends is not so great as made out by some academicians.

9.8 INFORMATIONAL CONTENT OF DIVIDENDS

It is contended that dividends are relevant because they have **informational value**. A company can make statements about its expected earnings growth to inform shareholders in order to create a favourable impression on them. However, these statements would be paid better attention if they follow with a dividend action – a disbursement of cash. The cash payment for dividends conveys to shareholders that the company is profitable and financially strong. When a firm changes its dividend policy in a significant manner, investors assume that it is in response to an expected change in the firm's profitability which will last long. An increase in payout ratio signals to shareholders a permanent or long-term increase in firm's expected earnings. It is, therefore, argued that the announcement of changes in dividend policy influences shares prices, and that managers use the dividend changes to convey information about the future earnings of their companies. They may also influence the perceptions of the investors about the risk of the company which follows a stable dividend policy. This sort of argument is also known as the **dividend-signalling hypothesis**.[20] Solomon contends that dividends may offer tangible evidence

Check Your Progress

5. Write a brief note on transactions costs?
6. What is the income tax provision regarding dividends?

20. Ross, S., The Determinant of Financial Structure: The Incentive-Signalling Approach, *Bell Journal of Economics,* spring 1977, pp. 23–40.

of the firm's ability to generate cash, and as a result, the dividend policy of the firm may affect the share price. He states,

...in an uncertain world in which verbal statements can be ignored or misinterpreted, dividend action does provide a clearcut means of 'making a statement' that 'speaks louder than a thousand words.[21]

NOTES

The dividend-signalling hypothesis implies that the most valuable dividend policy is the one that provides information that cannot be effectively communicated through other means. The most dividend policies are likely to be those that very closely reflect the firm's long-term performance. Let us consider some examples. Suppose that a company has been following a dividend policy of paying Rs 2 per share for quite sometime. Assume that the company's current earnings of, say, Rs 4 per share increases to, say, Rs 7 per share. If the company does not increase dividend from Rs 2 per share, the message conveyed to the shareholders will be that the increase in earnings is only a temporary, cyclical occurrence. Therefore, the market price of the share may not be affected very significantly. On the other hand, if the dividends were raised from, say, Rs 2 per share to Rs 3 per share, the shareholders would imply that management is expecting a long-term increase in the earning levels. This thinking of shareholders might have a favourable impact on the market value of the share. The market value of the share is affected not because of the change in dividends, but because of the information about change in the future expected earnings conveyed through the payment of higher dividends. Dividends per share do not affect the share value.

The reaction of market to the information conveyed by the dividend action depends upon the established dividend policy of the company. If the long-established policy of the firm is to pay, say, 50 per cent of earnings to shareholders and has increased dividends in the past only when earnings increased to new levels on a permanent basis, an increase in dividends will communicate convincing information that the earnings of the company have grown. As a result, the market price of the share may be significantly influenced. On the other hand, if a company follows a dividend policy of changing dividends with every cyclical change in earnings, the market price may not be affected or may be affected little because shareholders had the information.

The payout ratios of the companies may depend on the fact whether they are mature or growth companies. Mature companies may characterise high payout ratios as they may have few profitable investment opportunities. Shareholders of such companies are more concerned with dividend income. Therefore, any change in the amount of dividend is immediately reflected in the market price of the share. Growth companies, on the other hand, have a low payout ratio as they have enough internal investment opportunities to employ retained earnings. The shareholders of growth companies are interested in capital gains than dividends. A steady increase in both earnings and dividends coupled with a continuing low payout ratio gives the message that the firm expects to keep growing. A greater increase in the dividends than the earnings may convey to the shareholders that profitable investment opportunities of the firm are diminishing. This understanding of shareholders may depress the market price of the share in spite of an increase in the dividends.

MM accept the informational content of dividends. They contend that the price of the share is determined by the expected future earnings and the firm's investment policy and not by the dividends. They argue that the informational value of dividends indicates that they are merely a reflection of the firm's investment policy and the expected earnings and do not have any impact on the value in their own accord.

Do dividends matter? The above discussion of market imperfections indicates that shareholders may not be indifferent as to how the earnings of the firms are divided between dividends and retained earnings. The tax differential effect and the presence of flotation costs favour the capital gains resulting from the retention of earnings, while the existence of transactions costs, agency costs, information asymmetry and desire for current income and diversification favour the payment of dividends. The dividend policy may also become relevant because of the informational content of dividend.

21. Solomon, Ezra, *The Theory of Financial Management*, Colombia University Press, 1963, p. 142.

NOTES

9.9 LET US SUMMARIZE

- Earnings distributed to shareholders are called dividends. The percentage of earnings paid as dividends is called payout ratio.
- A high payout ratio means more dividends and less funds for expansion and growth. A low payout, on the other hand, results in a higher growth.
- Does dividend policy affect the market value of the firm? Whether dividend will increase value or not may depend on the profitable investment opportunities available to the firm.
- In Walter's view it depends on the profitability of investment opportunities available to the firm and the cost of capital. If the firm has profitable opportunities, its value will be maximum when 100 per cent of earnings are retained.
- Walter's formula for the market price of shares is:

$$P = \frac{\text{DIV}}{k} + \frac{r(\text{EPS} - \text{DIV})/k}{k}$$

  where r is return on investment opportunities and k is the cost of capital.
- Gordon also arrives at the same conclusion with the help of the following formula:

$$P_0 = \frac{\text{DIV}_1}{k - rb}$$

  where b is the retention ratio and $rb = g$ is growth in dividends.
- Yet another view is that because of the uncertainty of capital gains, investors like more dividends. This implies that, the market price of shares of high-payout companies will command premium.
- Miller and Modigliani do not agree with the view that dividends affect the market value of shares. According to them if the investment policy of the firm is given, then dividend policy is a trade-off between cash dividends and issue of ordinary shares. The share price will be adjusted by the amount of dividend distributed. Thus, the existing shareholder is neither better off nor worse off. His wealth remains unchanged. For their view, M–M assume perfect capital market, no transaction costs and no taxes.
- The practical world is not simple; there exist transaction costs as well as taxes. In such a world, one view is that investors like cash dividends. Thus there is a clientele for high-payout shares.
- Except tax-exempt investors, there does not seem to be a strong reason for investors to prefer high-payout shares. In fact, in a tax-differential world, where capital gains are taxed at low rate, investors in high-tax brackets would prefer low-payout shares.
- In an extreme situation like the one currently prevailing in India, where dividends are not taxed while capital gains are taxed, investors will prefer dividends.
- Thus, there does not seem to be a consensus on whether dividends matter or not. In practice, a number of factors will have to be considered before deciding about the appropriate dividend policy of the firm.

9.10 KEY CONCEPTS

Agency costs
Dividend yield
High-payout clientele
Information content of dividends
Perferct capital markets
Split-rate taxation
Declining firm
Double taxation
Imputation taxation
Low-payout clientele
Retention ratio
The bird-in-the-hand
Dividend signalling
Growth firm
Information asymmetry
Payout ratio
Single taxation
argument

9.11 ILLUSTRATIVE SOLVED PROBLEMS

NOTES

Problem 9.1: The earnings per share of a company are Rs 10. It has an internal rate of return of 15 per cent and the capitalisation rate of its risk class is 12.5 per cent. If Walter's model is used: (*i*) What should be the optimum payout ratio of the firm? (*ii*) What would be the price of the share at this payout? (*iii*) How shall the price of the share be affected if a different payout were employed?

Solution

Walter's model to determine share value is:

$$P = \frac{\text{DIV} + (r/k)(\text{EPS} - \text{DIV})}{k}$$

(*i*) If $r/k > 1$, the value of the share will increase as EPS has increased. The price of the share would be maximum when the firm retains all the earnings. Thus, the optimum payout ratio in this case is zero.

(*ii*) When the optimum payout is zero, the price of the share is:

$$P = \frac{0 + (0.15/0.125)(10 - 0)}{0.125} = \frac{12}{0.125} = \text{Rs}\,96$$

(*iii*) If the firm, under the condition of $r/k > 1$, chooses a payout other than zero, the price of the share will fall. Suppose the firm has a payout of 20 per cent, the price of the share will be:

$$P = \frac{2 + (0.15/0.125)(10 - 2)}{0.125} = \frac{11.60}{0.125} = \text{Rs}\,92.80$$

Problem 9.2: A company has a total investment of Rs 500,000 in assets, and 50,000 outstanding ordinary shares at Rs 10 per share (par value). It earns a rate of 15 per cent on its investment, and has a policy of retaining 50 per cent of the earnings. If the appropriate discount rate of the firm is 10 per cent, determine the price of its share using Gordon's model. What shall happen to the price of the share if the company has a payout of 80 per cent or 20 per cent?

Solution:

The share valuation model of Gordon is:

$$P_0 = \frac{\text{DIV}_1}{k - g} = \frac{(1 - b)\text{EPS}_1}{k - br} = \frac{(1 - b)rA}{k - br}$$

where A represents investment per share, which is Rs 10 in this case.

(*i*) At a payout of 50 per cent, the price of the share is:

$$P_0 = \frac{(1 - 0.5)0.15 \times 10}{0.10 - 0.15 \times 0.5} = \frac{0.75}{0.025} = \text{Rs}\,30$$

(*ii*) At a payout of 80 per cent, the price of the share is:

$$P_0 = \frac{(1 - 0.2)0.15 \times 10}{0.10 - 0.15 \times 0.2} = \frac{1.20}{0.07} = \text{Rs}\,17$$

(*iii*) When the payout is 20 per cent, the price of the share is determined as follows:

$$P_0 = \frac{(1 - 0.8)0.15 \times 10}{0.10 - 0.15 \times 0.8} = \frac{0.30}{(-)0.02} = \text{Rs}\,15$$

The price is negative. This is an absurd result and is due to some simplifying assumptions of Gordon's model. For example, it is assumed that k and r constant and do not change with retention and uncertainty. If these factors are allowed in the model, we will not get negative price of the share.

NOTES

9.12 ANSWERS TO 'CHECK YOUR PROGRESS'

1. The most important aspect in dividend management is to determine the amount of earnings to be distributed to shareholders and the amount to be retained in the firm.
2. Internal financing, constant cost of capital and rate of return, 100 percent payout or retention and constant EPS and DIV are the some assumptions of Walter model.
3. Arbitrage is the process of buying a security in one market at a cheaper price and selling it in another market at a higher price.
4. Modiglani-Miller approach holds that under a perfect market situation, the dividend policy of a firm is irrelevant, as it does not affect the value of the firm.
5. Transaction/Floatation costs refer to the cost of issue of shares and include cost of preparing and issuing prospectus, underwriting fee, broker's commission etc.
6. As per current provisions of Income Tax Act 1961, Dividend is tax-free in the hands of investor.

9.13 QUESTIONS AND EXERCISES

Review Questions

1. What are the essentials of Walter's dividend model? Explain its shortcomings.
2. What are the assumptions which underlie Gordon's model of dividend effect? Does dividend policy affect the value of the firm under Gordon's model?
3. "Walter's and Gordan's models are essentially based on the same assumptions. Thus, there is no basic difference between the two models." Do you agree or not? Why?
4. "According to Walter's model the optimum payout ratio can be either zero or 100 per cent." Explain the circumstances, when this is true.
5. "The contention that dividends have an impact on the share price has been characterised as the bird-in-the-hand argument." Explain the essentials of this argument. Why is this argument considered fallacious?
6. What is Miller-Modigliani's dividend irrelevance hypothesis? Critically evaluate its assumptions.
7. "The assumptions underlying the MM dividend irrelevance hypothesis are unrealistic." Explain and illustrate.
8. Give arguments to support the view that dividends are relevant.
9. What is the informational content of dividend payments? How does it affect the share value?
10. What is the relationship between taxes and dividend policy? Explain by citing the impact of different tax systems.

Exercises

1. A company earns Rs 10 per share at an internal rate of 15 per cent. The firm has a policy of paying 40 per cent of earnings as dividends. If the required rate of return is 10 per cent, determine the price of the share under (*i*) Walter's model, (*ii*) Gordon's model.
2. Saraswati Glass Works has an investment of Rs 30 crore divided into 30 lakh ordinary shares. The profitability rate of the firm is 20 per cent and the capitalisation rate is 12.5 per cent. What is the optimum dividend payout for the firm if Walter's model is used? What shall be the price of the share at optimum payout? Shall your answer change if the profitability rate is assumed to be 15 per cent? What would happen if profitability rate is 10 per cent? Show computations.

NOTES

3. The following data relate to a firm: earnings per share Rs 10, capitalisation rate 10 per cent, retention ratio 40 per cent. Determine the price per share under Walter's and Gordon's models if the internal rate of return is 15 per cent, 10 per cent and 5 per cent.

4. Manex Company has outstanding 50 lakh shares selling at Rs 120 per share. The company is thinking of paying a dividend of Rs 10 per share at the end of current year. The capitalisation rate for the risk class of this firm is 10 per cent. Using Modigliani and Miller's model you are required: (*i*) to calculate the price of the share at the end of the current year if dividends are paid and if they are not paid; (*ii*) to determine the number of shares to be issued if the company earns Rs 9 crore, pays dividends and makes new investments of Rs 6.60 crore?

5. A company has outstanding 10 lakh shares. The company needs Rs 5 crore to finance its investments, for which Rs 1 crore is available out of profits. The market price of per share at the end of current year is expected to be Rs 120. If the discount rate is 10 per cent, determine the present value of a share using the MM model.

6. The current market price of a company's shares is Rs 125 per share. The expected earnings per share and dividend per share are Rs 10 and Rs 5 respectively. The shareholders' expected rate of return is 15 per cent. Suppose the company declares that it will switch to 100 per cent payout policy, issuing shares as necessary to finance growth. Use the perpetual-growth model to show that current price of share is unchanged.

7. The following data relate to a firm in the cotton textile industry:

	Rs in crore
Share capital (at Rs 10 per share)	12.50
Reserve	7.50
Profit after tax	1.85
Dividends paid	1.50
P/E ratio	13.33

You are required (*a*) to comment on the firm's dividend policy using Walter's model; (*b*) to determine the optimum payout ratio using Walter's model; (*c*) to determine the price – earnings ratio at which dividend payout will have no effect on share price.

8. Turant Pharma is thinking of diversifying its business in the field of energy. The firm has decided to make a capital expenditure of Rs 35 crore in an energy project. The project is expected to yield a positive net present value of Rs 25 crore. The firm is also considering a payment of dividends of Rs 20 crore. The internal funds available with the firm are Rs 10 crore. It has a paid-up share capital of Rs 50 crore divided into 5 crore shares of Rs 10 each. The current price of the firm's share is Rs 25. The firm has not borrowed funds in the past, and would continue with this policy in the future.

   Given the firm's capital expenditure and the policy of zero borrowing, show the implications of the payment of dividends for the shareholder value. Will your answer be different if Turant decides not to pay any dividends? Assume no taxes and no issue costs.

9. The share of *X* Company is selling for Rs 100. It is a no-tax paying company. The price of *X*'s share is expected to be Rs 115 after one year. Company *Y* is identical to company *X* in terms of risk and the future earnings potential. It is a dividend paying company, and is expected to pay a dividend of Rs 10 per share after one year. Assume dividend income is taxed at 35 per cent and there is no tax on capital gains. What should be the current price of *B*'s share and how much should be its before-tax expected return?

10. The shares of Firm *A* and Firm *B* have identical risk. Both have an after-tax required rate of return of 15 per cent. Firm *A* pays no dividend, while Firm *B* is a high dividend paying firm. The price of Firm *A*'s share is expected to be Rs 60 after one year and the price of Firm *B* Rs 50 with Rs 10 dividend per share. Assume that the income tax rate is 40 per cent and capital gain tax rate is 20 per cent. Determine the current prices of Firm *A*'s and Firm *B*'s shares.

NOTES

11. The expected before-tax incomes (consisting of dividend and capital gains) on shares of firms *X*, *Y* and *Z* are given below:

Share	*Dividend income (Rs)*	*Capital gain (Rs)*
X	0	10
Y	5	5
Z	10	0

Suppose that the current price of each share is Rs 60. Further, an investor is in 50 per cent tax bracket and capital gain tax rate is 20 per cent. Which share will give highest after-tax return to the investor? Now suppose that the each share was expected to have expected after-tax yield of 12 per cent for the investor. Determine the price of each share.

UNIT 10 DIVIDEND POLICY

NOTES

Structure

10.0 INTRODUCTION

We have discussed in Chapter 7 whether dividends affect the value of a share. The theoretical views differ on this issue. On the one hand, we have the view that dividends increase the value of the share. On the other hand, there is the view that dividends are bad as they result into the payment of higher taxes (because of the difference in the ordinary income and capital gains tax rates), and thus, they reduce the shareholders' wealth. We also have a moderate view, which asserts that because of the information value of dividends, some dividends should be always paid to maintain the value of the share. Given these theoretical differences, how do companies set their dividend policies in practice? What factors do they consider in setting their policies?

10.1 UNIT OBJECTIVES

- Explain the objectives of dividend policy
- Understand the factors that influence a firm's dividend policy
- Focus on the importance of the stability of dividend
- Discuss the significance and implications of bonus shares and stock splits
- Explain the corporate behaviour of dividends

NOTES

10.2 OBJECTIVES OF DIVIDEND POLICY

As discussed in the previous chapter, a firm's **dividend policy** has the effect of dividing its net earnings into two parts: retained earnings and dividends. The retained earnings provide funds to finance the firm's long-term growth. It is the most significant source of financing a firm's investments in practice. Dividends are paid in cash. Thus, the distribution of earnings uses the available cash of the firm. A firm which intends to pay dividends and also needs funds to finance its investment opportunities will have to use external sources of financing, such as the issue of debt or equity. Dividend policy of the firm, thus, has its effect on both the long-term financing and the wealth of shareholders. As a result, the firm's decision to pay dividends may be shaped by the following two possible viewpoints.

10.2.1 Firm's Need for Funds

When dividend decision is treated as a financing decision, the net earnings of the firm may be considered as a source of long-term funds. With this approach, dividends will be paid only when the firm does not have profitable investment opportunities. The firm grows at a faster rate when it accepts highly profitable investment projects. External equity could be raised to finance investments. But retained earnings are preferred because, unlike external equity, they do not involve any flotation costs. The distribution of cash dividends causes a reduction in internal funds available to finance profitable investment opportunities and consequently, either constrains growth or requires the firm to find other costly sources of financing.[1] Thus, firms may retain their earnings as a part of long-term financing decision. The dividends will be paid to shareholders when a firm cannot profitably reinvest earnings. With this approach, dividend decision is viewed merely as a **residual decision**.

10.2.2 Shareholders' Need for Income

One may argue that capital markets are not perfect; therefore, shareholders are not indifferent between dividends and retained earnings. Because of the market imperfections and uncertainty, shareholders may prefer the near dividends to the future dividends and capital gains. Thus, the payment of dividends may significantly affect the market price of the share. Higher dividends may increase the value of the shares and low dividends may reduce the value. It is believed by some that, in order to maximise wealth under uncertainty, the firm must pay enough dividends to satisfy investors.[2] Investors in high tax brackets, on the other hand, may prefer to receive capital gains rather than dividends. Their wealth will be maximised if firms retain earnings rather than distributing them.

The management of a firm, while evolving a dividend policy, must strike a proper balance between the above-mentioned two approaches. When the firm increases the retained portion of the net earnings, shareholders' current income in the form of dividends decreases. But the use of retained earnings to finance profitable investments will increase the future earnings. On the other hand, when dividends are increased, shareholders' current income will increase, but the firm may have to forego some investment opportunities for want of funds and consequently, the future earnings may decrease. Management should develop a dividend policy, which divides the net earnings into dividends and retained earnings in an optimum way to achieve the objective of maximising the wealth of shareholders. The development of such policy will be greatly influenced by investment opportunities available to the firm and the value of dividends as against capital gains to the shareholders. The other possible aspects of the dividend policy relate to the stability of dividends, the constraints on paying dividends and the forms of dividends.

Check Your Progress

1. Why is a firm's dividend policy important?
2. Why is dividend decision sometimes known as a residual decision?

1. Rozeff, M.S., Growth, Beta and Agency Costs as Determinants of Dividends Payout Ratios. *Journal of Financial Research*, 5 (fall 1982), pp. 249–59; Weston, J.F. and Copeland, T.E., *Managerial Finance*, Dryden Press, 1986, p. 659.
2. This is the bird-in-the-hand argument expounded by Gordon, M.J., *The Investment, Financing and Valuation of Corporation*, Richard D. Irwin, 1962. Also, see Ch. 17 of this book.

10.3 PRACTICAL CONSIDERATIONS IN DIVIDEND POLICY

NOTES

The view that dividends are irrelevant is not entirely correct, once we modify the assumptions underlying this view to consider the realities of the world. In practice, every firm follows some kind of dividend policy. The typical dividend policy of most firms is to retain between one-third to half of the net earnings and distribute the remaining amount to shareholders. Companies in India specify dividends in terms of a **dividend rate** (a percentage of the paid-up capital per share). Most of them also tend to increase dividend rate particularly when their profits increase substantially.

There are a very few exceptions to the practice of paying high dividends and continuously increasing dividends. The Chairman and Managing Director of the Great Eastern Shipping Company Limited, is in favour of not paying any dividends. Deliberating on the company's dividend policy in his 1992–93 Chairman's Statement, he stated:

... We do not intend to maintain dividends as a percentage of the face value of your share, nor do we intend to maintain dividend at a fixed rupee value.... it is our intention to retain as much profit as we possibly can, ideally we should like to retain all our earnings, we certainly believe that to be in the shareholders' interest, … payment of dividends is an inefficient way of increasing shareholders' wealth. That, had we been a new company the most sensible policy may well have been to pay no dividends and accumulate our profits. This is a policy followed by the most successful companies in the world. We have been inhibited in doing so by tradition and conventional wisdom. …

The following questions relate to the dividend policy of a firm:

- What are the firm's financial needs given its growth plans and investment opportunities?
- Who are the firm's shareholders and what are their preferences with regard to dividend payments?
- What are the firm's business risks?
- What are the firm's constraints–financial and legal–in paying dividends?
- Is control a consideration for the firm?
- Should the firm follow a stable dividend policy?
- How should the firm pay dividends—cash dividend or bonus shares or shares buyback?

It is not easy to answer these questions. A number of factors will have to be evaluated to analyse each of these questions to evolve a long-term dividend policy for the firm. Broadly speaking, to develop a long-term dividend policy, the directors of a company should aim at bringing a balance between the desires of shareholders and the needs of the company. The factors that generally influence the dividend policy of the firm are discussed below.[3]

10.3.1 Firm's Investment Opportunities and Financial Needs

Firms should tailor their dividend policies to their long-term investment opportunities to have maximum financial flexibility and avoid financial frictions and costs of raising external funds. Growth firms have a large number of investment opportunities requiring substantial amount of funds. Hence they will give precedence to the retention of earnings over the payment of dividends in order to finance its expanding activities. For matured firms, investment opportunities occur infrequently. These firms may distribute most of their earnings. The retained earnings of these firms during periods, when they do not have investment opportunities, may be invested in short-term securities yielding nominal returns. Some of these firms may follow the policy of paying 100 per cent dividends and raise external funds when investment opportunities occur.

3. A variety of factors are indicated to influence a firm's dividend policy. See Hastings, P.G., *The Management of Business Finance*, Von Nostrand Co., 1966; Weston, J.F. and Brigham, E.F., *Managerial Finance*, Dryden Press, 1972, pp. 346–49; Brandt, L.K., *Analysis* for *Financial Management*, Prentice-Hall, 1972; Van Horne, J.C., *Finance Management and Policy*, Prentice-Hall of India, 1976, pp. 287–90.

NOTES

Generally, retained earnings should be used as a source of internal financing only when a company has profitable investment opportunities. If shareholders themselves have better investment opportunities, the earnings should be distributed to them so that they may be able to maximise their wealth. Theoretically, when the company has an internal rate of return greater than the return required by shareholders, it would be to the advantage of shareholders to allow the reinvestment of earnings by the company. When the company does not have highly profitable opportunities and earns a rate on investment, which is lower than the rate required by shareholders, it is not in the interest of shareholders to retain earnings.

It is sometimes argued that, even if the company has highly profitable investment opportunities, earnings should be distributed and funds should be raised externally to finance the investment. This will exert a discipline on the company's management in proper deployment of funds. But companies in practice prefer to retain earnings because issuing new share capital is inconvenient as well as involves flotation costs. If the company raises debt, the financial obligations and risk will increase. As a matter of fact, directors may neither follow a practice of paying 100 per cent dividends, nor a practice of retaining 100 per cent earnings. The company may have a **target payout ratio** consistent with its investment opportunities and may like to achieve it slowly and steadily. In the absence of profitable investment opportunities, it can pay some 'extra' dividend, but still retaining some earnings for the continued existence of the enterprise. Though shareholders are the owners of the company and directors should follow a policy desired by them, yet they cannot sacrifice the interests of other groups, such as debt-holders, employees, society and customers. Shareholders are the residual claimants to the earnings of the company. Directors must retain some earnings, whether or not profitable investment opportunities exist, to *maintain* the company as a sound and solvent enterprise and to have financial flexibility. Only a financially sound and flexible company can discharge its debt obligations, provide monetary benefits to its employees, produce quality products for its customers and make social contributions by paying taxes and making donations.[4]

Thus, depending on the needs to finance their long-term investment opportunities, companies may follow different dividend policies. **Mature companies** that have fewer investment opportunities may generally have high payout ratios. Shareholders of these companies would be more interested in dividends, as they obtain higher return on their investments outside the company. The share prices of such companies are very sensitive to dividend changes. The directors of these companies retain only a small portion of the earnings to meet emergent financial needs and to finance the occasional investment opportunities and distribute the rest. **Growth companies**, on the other hand, have plenty of investment opportunities and hence, they may have low payout ratios. They are continuously in need of funds to finance their fast growing fixed assets. The distribution of earnings will reduce the funds of the company. Therefore, sometimes growth companies retain most of their earnings and issue bonus shares, regularly or from time to time, to satisfy the dividend needs of shareholders. These companies would slowly increase the amount of dividends as the profitable investment opportunities start fading.

10.3.2 Shareholders' Expectations

Legally, the board of directors has discretion to decide the distribution of the earnings of a company. Shareholders are the legal owners of the company, and directors, appointed by them, are their agents. Therefore, directors should give due importance to the expectations of shareholders in the matter of dividend decision. Shareholders' preference for dividends or capital gains may depend on their economic status and the effect of tax differential on dividends and capital gains. In most countries, dividend income is taxed at a rate higher than the capital gains. A wealthy shareholder, in a high income-tax bracket, may be interested in capital gains than current dividends. On the other hand, a retired person with small means, whose main source of income is dividend, would like to get regular dividend and may not be interested in capital gains.[5] The ownership concentration in a firm may define the shareholders' expectations.

4. Hasting, *op. cit.*
5. Dividend income in India has been completely exempted from tax while on capital gains, the tax rate is 20 per cent. Thus, the Indian shareholders may prefer dividend over capital gains. The companies, on the other hand, will have to pay tax at 12.5 per cent on the dividends distributed to shareholders. Thus, the effective corporate tax rate would be higher (than 35 per cent) for the dividend distributing companies.

NOTES

In case of a **closely held company**, the body of the shareholders is small and homogeneous and management usually knows the expectations of shareholders. Therefore, they can easily adopt a dividend policy, which satisfies most shareholders. If most of the shareholders are in high tax brackets and have a preference for capital gains to current dividend incomes, the company can establish a dividend policy of paying sufficient dividends and retaining the earnings within the company, subject to its growth opportunities.

It is a formidable task to ascertain the preferences of shareholders in a **widely held company**. The number of shareholders is very large, they are dispersed and they may have diverse desires regarding dividends and capital gains. Hence it is not possible in case of widely held company to follow a dividend policy, which equally satisfies all shareholders. The firm may follow a dividend policy, which serves the purpose of the dominating group, but does not completely neglect the desires of others. Shareholders of a widely held company may be divided, for example, into four groups: small, retired, wealthy and institutional shareholders.[6]

Small shareholders are not the frequent purchasers of the shares. They hold a small number of shares in a few companies with the purpose of receiving dividend income, or sometimes making capital gains. They may not have a definite investment policy. They purchase shares only when their savings permit. **Retired and old persons** generally invest in shares to get a regular income. They use their savings or provident or pension funds to purchase shares. These persons may, therefore, select shares of the companies that have a history of paying regular and liberal dividends. However, a retired person who has some source of income and is in a high tax bracket may be interested in capital gains as well. **Wealthy investors** are very much concerned with the dividend policy followed by a company. They have a definite investment policy of increasing their wealth and minimising taxes. These persons are in high tax brackets and the dividends received in cash by them would be taxed at a high rate. Therefore, they generally prefer a dividend policy of retaining earnings and distributing bonus shares. The wealthy shareholders' group is quite dominating in many companies as they hold relatively large blocks of shares and are able to influence the composition of the board of directors by their significant voting rights. On the dividend policies of these companies, this group will have a considerable influence. **Institutional investors** purchase large blocks of shares to hold them for relatively long periods of time. Institutional investors, unlike wealthy shareholders, are not concerned with personal income taxes but with profitable investments. Most institutional investors avoid speculative issues, seek diversification in their investment portfolio and favour a policy of regular cash dividend payments.

It should be obvious from the above discussion that, in the case of a widely held company, the interests of the various shareholders' groups are in conflict. It is not easy to reconcile these conflicting interests of the different types of shareholders. However, the board of directors should consider two points.[7] First, the board should adopt a dividend policy, which gives some consideration to the interests of each of the groups comprising a substantial proportion of shareholders. Second, the dividend policy, once established, should be continued as long as it does not interfere with the financing needs of the company. A definite dividend policy, followed for a long period in the past, tends to create a particular kind of **clientele** for the company. That is, it attracts those investors who consider the dividend policy in accord with their investment requirements. If the company suddenly changes its dividend policy, it may work to the detriment of these shareholders, as they may have to switch to other companies to fulfil their investment needs. Thus, an established dividend policy should be changed slowly and only after having analysed its probable effects on the existing shareholders.

10.3.3 Constraints on Paying Dividends

Most companies recognise that the shareholders have some desire to receive dividends, although shareholders are also interested in the capital gains. How much dividend should a company pay? The company's decision regarding the amount of earnings to be distributed as dividends depends on legal and financial constraints.

6. Hasting's, *op. cit.*, p. 378.
7. Hasting's, *ibid*., p. 380.

NOTES

Legal restrictions The dividend policy of the firm has to evolve within the legal framework and restrictions. The directors are not legally compelled to declare dividends. For example, the Indian Companies Act provides that dividend shall be declared or paid only out of the current profits or past profits after providing for depreciation. However, the Central Government is empowered to allow any company to pay dividend for any financial year out of the profits of the company without providing for depreciation. The Central Government shall give such relief only when it is in the public interest. The dividend should be paid in cash, but a company is not prohibited to capitalise profits or reserves (retained earnings) for the purpose of issuing fully paid bonus shares (stock dividend). It has been held in some legal cases that **capital profits** should not be distributed as dividends unless (*i*) the distribution is permitted by the company's Articles of Association and (*ii*) the profits have been actually realised.

The legal rules act as boundaries within which a company can operate in terms of paying dividends. Acting within these boundaries, a company will have to consider many financial variables and constraints in deciding the amount of earnings to be distributed as dividends.

Liquidity The payment of dividends means cash outflow. Although a firm may have adequate earnings to declare dividend, it may not have sufficient cash to pay dividends. Thus, the cash position of the firm is an important consideration in paying dividends; the greater the cash position and overall liquidity of a company, the greater will be its ability to pay dividends. A mature company is generally liquid and is able to pay large amount of dividends. It does not have much investment opportunities; much of its funds are not tied up in permanent working capital and, therefore, it has a sound cash position. On the other hand, growing firms face the problem of liquidity. Even though they make good profits, they continuously need funds for financing growing fixed assets and working capital. Because of the insufficient cash or pressures on liquidity, in case of growth firms, management may follow a conservative dividend policy.

Financial condition and borrowing capacity The financial condition or capability of a firm depends on its use of borrowings and interest charges payable. A high degree of financial leverage makes a company quite vulnerable to changes in earnings, and also, it becomes quite difficult to raise funds externally for financing its growth. A highly levered firm is, therefore, expected to retain more to strengthen its equity base. However, a company with steady growing earnings and cash flows and without much investment opportunities, may follow a high dividend payment policy in spite of high amount of debt in its capital structure. A growth firm lacking liquidity may borrow to pay dividends. But this is not a sound policy. This will adversely affect the firm's financial flexibility. Financial flexibility includes the firm's ability to access external funds at a later date. The firm may lose the flexibility and capacity of raising external funds to finance growth opportunities in the future.

Access to the capital market A company that is not sufficiently liquid can still pay dividends if it is able to raise debt or equity in the capital markets. If it is well established and has a record of profitability, it will not find much difficulty in raising funds in the capital markets. Easy accessibility to the capital markets provides flexibility to the management in paying dividends as well as in meeting the corporate obligations. A fast growing firm, which has a tight liquidity position, will not face any difficulty in paying dividends if it has access to the capital markets. A company that does not have sound cash position and it is also unable to raise funds, will not be able to pay dividends. Thus, the greater is the ability of the firm to raise funds in the capital markets, greater will be its ability to pay dividends even if it is not liquid.

Restrictions in loan agreements Lenders may generally put restrictions on dividend payments to protect their interests when the firm is experiencing low liquidity or low profitability. As such, the firm agrees as part of a contract with a lender to restrict dividend payments. For example, a loan agreement may prohibit payment of dividends as long as the firm's debt-equity ratio is in excess of, say, 1.5:1 or when the liquidity ratio is less than, say, 2:1 or may require the firm to pay dividends only when some amount of current earnings has been transferred to a sinking fund established to retire debt. These are some of the examples of the restrictions put by lenders on the payment of dividends. When these restrictions are put, the company is forced to retain earnings and have a low payout.

Inflation Inflation can act as a constraint on paying dividends. Our accounting system is based

on historical costs. Depreciation is charged on the basis of original costs at which assets were acquired. As a result, when prices rise, funds equal to depreciation set aside would not be adequate to replace assets or to maintain the capital intact. Consequently, to maintain the capital intact and preserve their earnings power, firms earnings may avoid paying dividends. On the contrary, some companies may follow a policy of paying more dividends during high inflation in order to protect the shareholders from the erosion of the real value of dividends. Companies with falling or constant profits may not be able to follow this policy.

Control The objective of maintaining control over the company by the existing management group or the body of shareholders can be an important variable in influencing the company's dividend policy. When a company pays large dividends, its cash position is affected. As a result, the company will have to issue new shares to raise funds to finance its investment programmes. The control of the existing shareholders will be diluted if they do not want or cannot buy additional shares. Under these circumstances, the payment of dividends may be withheld and earnings may be retained to finance the firm's investment opportunities.

NOTES

10.4 STABILITY OF DIVIDENDS

Stability of dividends is considered a desirable policy by the management of most companies in practice. Shareholders also seem generally to favour this policy and value stable dividends higher than the fluctuating ones. All other things being the same, the stable dividend policy may have a positive impact on the market price of the share.

Stability of dividends also means regularity in paying some dividend annually, even though the amount of dividend may fluctuate over years, and may not be related with earnings. There are a number of companies, which have records of paying dividend for a long, unbroken period. More precisely, stability of dividends refers to the amounts paid out regularly. Three forms of such stability may be distinguished:

- Constant dividend per share or dividend rate
- Constant payout
- Constant dividend per share plus extra dividend

10.4.1 Constant Dividend Per Share or Dividend Rate

In India, companies announce dividend as a per cent of the paid-up capital per share. This can be converted into dividend per share. A number of companies follow the policy of paying a fixed amount per share or a fixed rate on paid-up capital as dividend every year, irrespective of the fluctuations in the earnings. This policy does not imply that the dividend per share or dividend rate will never be increased. When the company reaches new levels of earnings and expects to maintain them, the annual dividend per share or dividend rate may be increased. The earnings per share and the dividend per share relationship under this policy is shown in Figure 10.1.

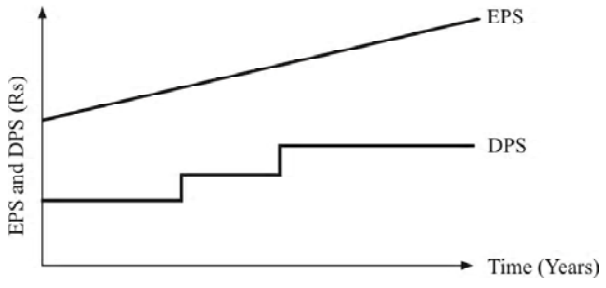


Figure 10.1: Constant dividend per share policy

It is easy to follow this policy when earnings are stable. However, if the earnings pattern of a company shows wide fluctuations, it is difficult to maintain such a policy. With earnings fluctuating from year to year, it is essential for a company, which wants to follow this policy to build up

Check Your Progress

3. Should mature companies and growth companies follow the same dividend policies?
4. Can different types of shareholders have different types of dividend expectations?
5. What are the important variables affecting the firm's decision to pay dividends?

NOTES

surpluses in years of higher than average earnings to maintain dividends in years of below average earnings. In practice, when a company retains earnings in good years for this purpose, it earmarks this surplus as **dividend equalisation reserve**. These funds are invested in current assets like tradable (marketable) securities, so that they may easily be converted into cash at the time of paying dividends in bad years.

A constant dividend per share policy puts ordinary shareholders at per with preference shareholders irrespective of the firm's investment opportunities or the preferences of shareholders.[8] Those investors who have dividends as the only source of their income may prefer the constant dividend policy. They do not accord much importance to the changes in share prices. In the long run, this may help to stabilise the market price of the share.[9]

10.4.2 Constant Payout

The ratio of dividend to earnings is known as **payout ratio**. Some companies may follow a policy of constant payout ratio, i.e., paying a fixed per centage of net earnings every year. With this policy the amount of dividend will fluctuate in direct proportion to earnings. If a company adopts a 40 per cent payout ratio, then 40 per cent of every rupee of net earnings will be paid out. For example, if the company earns Rs 2 per share, the dividend per share will be Re 0.80 and if it earns Rs 1.50 per share the dividend per share will be Re 0.60. The relation between the earnings per share and the dividend per share under this policy is exhibited in Figure 10.2.

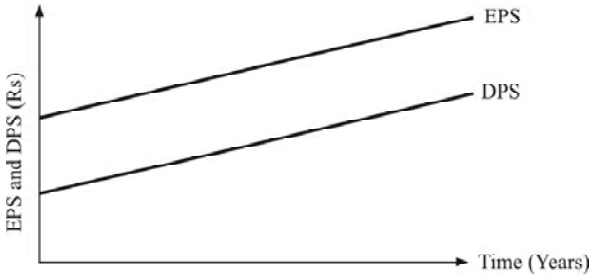


Figure 10.2: Dividend policy of constant payout ratio

This policy is related to a company's ability to pay dividends. If the company incurs losses, no dividends shall be paid regardless of the desires of shareholders. Internal financing with retained earnings is automatic when this policy is followed. At any given payout ratio, the amount of dividends and the additions to retained earnings increase with increasing earnings and decrease with decreasing earnings. This policy does not put any pressure on a company's liquidity since dividends are distributed only when the company has profits.[10]

10.4.3 Constant Dividend Per Share Plus Extra Dividend

For companies with fluctuating earnings, the policy to pay a minimum dividend per share with a step-up feature is desirable. The small amount of dividend per share is fixed to reduce the possibility of ever missing a dividend payment. By paying extra dividend (a number of companies in India pay an **interim dividend** followed by a regular, **final dividend**) in periods of prosperity, an attempt is made to prevent investors from expecting that the dividend represents an increase in the established dividend amount. This type of policy enables a company to pay constant amount of dividend regularly without a default and allows a great deal of flexibility for supplementing the income of shareholders only when the company's earnings are higher than the usual, without committing itself to make larger payments as a part of the future fixed dividend. Certain shareholders like this policy because of the certain cash flow in the form of regular dividend and the option of earning extra dividend occasionally.

8. Brandt, *op. cit.*, p. 447.
9. *Ibid*.
10. *Ibid*., pp. 448–49.

We have discussed three forms of stability of dividends. Generally, when we refer to a stable dividend policy, we refer to the first form of paying constant dividend per share. A firm pursuing a policy of stable dividend, as shown in Figure 10.1, may command a higher price for its shares than a firm, which varies dividend amount with cyclical fluctuations in the earnings as depicted in Figure 10.2.

NOTES

10.4.4 Merits of Stability of Dividends

The stability of dividends has several advantages as discussed below:

- Resolution of investors' uncertainty.
- Investors' desire for current income.
- Institutional investors' requirements.
- Raising additional finances.

Resolution of investors' uncertainty We have argued in the previous chapter that dividends have informational value, and resolve uncertainty in the minds of investors. When a company follows a policy of stable dividends, it will not change the amount of dividends if there are temporary changes in its earnings. Thus, when the earnings of a company fall and it continues to pay same amount of dividend as in the past, it conveys to investors that the future of the company is brighter than suggested by the drop in earnings. Similarly, the amount of dividends is increased with increased earnings level only when it is possible to maintain it in future. On the other hand, if a company follows a policy of changing dividends with cyclical changes in the earnings, shareholders would not be certain about the amount of dividends.

Investors' desire for current income There are many investors, such as old and retired persons, women etc., who desire to receive regular periodic income. They invest their savings in the shares with a view to use dividends as a source of income to meet their living expenses. Dividends are like wages and salaries for them. These investors will prefer a company with stable dividends to the one with fluctuating dividends.

Institutional investors' requirements Financial, educational and social institutions and unit trusts also invest funds in shares of companies. In India, financial institutions such as IFCI, IDBI, LIC, and UTI are some of the largest investors in corporate securities. Every company is interested to have these financial institutions in the list of their investors. These institutions may generally invest in the shares of those companies, which have a record of paying regular dividends. These institutional investors may not prefer a company, which has a history of adopting an erratic dividend policy. Thus, to cater the requirement of institutional investors, a company prefers to follow a stable dividend policy.

Raising additional finances: A stable dividend policy is also advantageous to the company in its efforts to raise external finances. Stable and regular dividend policy tends to make the share of a company as quality investment rather than a speculation. Investors purchasing these shares intend to hold them for long periods of time. The loyalty and goodwill of shareholders towards a company increases with stable dividend policy. They would be more receptive to an offer by the company for further issues of shares. A history of stable dividends serves to spread ownership of outstanding shares more widely among small investors, and thereby reduces the chance of loss of control. The persons with small means, in the hope of supplementing their income, usually purchase shares of the companies with a history of paying regular dividends. A stable dividend policy also helps the sale of debentures and preference shares. The fact that the company has been paying dividend regularly in the past is a sufficient assurance to the purchasers of these securities that no default will be made by the company in paying their interest or preference dividend and returning the principal sum. The financial institutions are the largest purchasers of these securities. They purchase debentures and preference shares of those companies, which have a history of paying stable dividends.

10.4.5 Danger of Stability of Dividends

The greatest danger in adopting a stable dividend policy is that once it is established, it cannot be changed without seriously affecting investors' attitude and the financial standing of the

NOTES

company. If a company, with a pattern of stable dividends, misses dividend payment in a year, this break will have an effect on investors more severe than the failure to pay dividend by a company with unstable dividend policy. The companies with stable dividend policy create a 'clientele' that depends on dividend income to meet their living and operating expenses. A cut in dividend is considered as a cut in 'salary.' Because of the serious depressing effect on investors due to a dividend cut, directors have to maintain stability of dividends during lean years even though financial prudence would indicate elimination of dividends or a cut in it. Consequently, to be on the safe side, the dividend rate should be fixed at a conservative figure so that it may be possible to maintain it even in lean periods of several years. To give the benefit of the company's prosperity, extra or interim dividend, can be declared. When a company fails to pay extra dividend, it does not have a depressing effect on investors as the failure to pay a regular dividend does.

10.5 TARGET PAYOUT AND DIVIDEND SMOOTHING: LINTNER'S MODEL OF CORPORATE DIVIDEND BEHAVIOUR

We have discussed stability of dividends in terms of stable dividends per share (or dividend rate) and stable payout ratio. A stable payout ratio results into fluctuating dividend per share pattern, which could be a cause of uncertainty for investors. In practice, firms express their dividend policy either in terms of dividend per share or dividend rate. Does this mean that payout ratio is not considered important by firms while determining their dividend policies? Lintner,[11] in his study of the USA companies, found that firms generally think in terms of proportion of earnings to be paid out. Investment requirements are not considered for modifying the pattern of dividend behaviour. Thus firms generally have target payout ratios in view while determining change in dividend per share (or dividend rate).

What are the perceptions of managers of companies in India about the payment of dividends? A study[12] shows that managers are strongly in favour of companies regularly paying dividends and striving to move towards a target payout. The dividend policy should be stable, and should be changed only when it can be maintained in the future. Managers feel that current dividends depend on current earnings, the future earnings potential as well as on dividends paid in the previous year. Dividends must be paid even when a company needs funds for undertaking profitable investment projects.

How can Lintner's model be expressed in formal terms? Let us assume that a firm has EPS_1, as the expected earnings per share in year 1, and p as the target payout ratio. If the firm strictly follows stable payout policy, the expected dividend per share, DIV_1 will be:

$$DIV_1 = pEPS_1 \quad (1)$$

and dividend *change* (as compared to the dividend per share for the previous year, DIV_0) will be:

$$DIV_1 - DIV_0 = pEPS_1 - DIV_0 \quad (2)$$

But, in practice, firms do not change the dividend per share (or dividend rate) immediately with change in the earnings per share. Shareholders like a steadily growing dividend per share. Thus, firms change their dividends slowly and gradually even when there are large increases in earnings. This implies that firms have standards regarding the *speed* with which they attempt to move towards the full adjustment of payout to earnings. Lintner has, therefore, suggested the following formula to explain the change in dividends of firms in practice:

$$DIV_1 - DIV_0 = b\,(pEPS_1 - DIV_0) \quad (3)$$

Check Your Progress

6. Should a company follow a stable dividend policy? What are advantages and disadvantages of following such a policy?
7. What is the danger in adopting a stable dividend policy?

11. Lintner, J., Distribution of Incomes of Corporations Among Dividends, Retained Earning, and Taxes, *American Economic Review*, 46 (May 1956), pp. 97–133.
12. Bhat, Ramesh and Pandey, I.M., Dividend Decisions: A Study of Managers' Perception, *Decision*, Vol. 21, Nos. 1&2, January–June 1994.

where b is the **speed of adjustment**. A conservative company will move slowly towards its **target payout**.

The implications of Equation (3) are (*i*) that firms establish their dividends in accordance with the level of current earnings, and (*ii*) that the changes in dividends over time do not correspond exactly with changes in earnings in the immediate time period. In other words, the expected dividend per share (DIV_1) depends on the firm's current earnings (EPS_1) as well as the dividend per share of the previous year (DIV_0); the previous year's dividend per share (DIV_0) depends on that year's earnings per share (EPS_0) and the dividend per share in the year before (DIV_{-1}).

NOTES

Lintner's model can be expressed in the form of the following regression equation:

$$\begin{aligned} DIV_t - DIV_{t-1} &= a + b(pEPS_t - DIV_{t-1}) + e_t \\ DIV_t &= a + bpEPS_t - bDIV_{t-1} + DIV_{t-1} + e_t \\ DIV_t &= a + bDIV^*_{t-1} + (1-b)DIV_{t-1} + e_t \end{aligned} \quad (4)$$

where DIV_t is the dividend per share in year t, b is the adjustment factor, $DIV^*_t = pEPS_t$ is desired dividend per share, p is the target payout ratio; DIV_{t-1} is dividend per share in year $t-1$ and e is the error term.[13]

We can interpret the term $(1-b)$ as a **safety factor** that the management observes by not increasing the dividend payment to the levels where it cannot be maintained. Together coefficients a and b can be used to test the hypothesis that management is more likely to increase dividend over time rather than cut them.

10.6 FORMS OF DIVIDENDS

The usual practice is to pay dividends in cash. Other options are payment of the **bonus shares** (referred to as **stock dividend** in USA) and **shares buyback**. In this section, we shall also discuss **share split**. The share (stock) split is not a form of dividend; but its effects are similar to the effects of the bonus shares.

10.6.1 Cash Dividend

Companies mostly pay dividends in cash. A company should have enough cash in its bank account when cash dividends are declared. If it does not have enough bank balance, arrangement should be made to borrow funds. When the company follows a stable dividend policy, it should prepare a cash budget for the coming period to indicate the necessary funds, which would be needed to meet the regular dividend payments of the company. It is relatively difficult to make cash planning in anticipation of dividend needs when an unstable policy is followed.

The cash account and the reserves account of a company will be reduced when the cash dividend is paid. Thus, both the total assets and the net worth of the company are reduced when the cash dividend is distributed. The market price of the share drops in most cases by the amount of the cash dividend distributed.[14]

10.6.2 Bonus Shares

An issue of **bonus shares** is the distribution of shares free of cost to the existing shareholders. In India, bonus shares are issued in addition to the cash dividend and not in lieu of cash dividend.

Check Your Progress

8. What were Lintner's main findings in his study of US companies with regard to their dividend policies?

13. In practice, the target payout may not be known. Hence, Equation (4) can be written as follows:

$$DIV_t = a + b_1 EPS_t + b_2 DIV_{t-1} + e_t$$

where $b_1 = bp$ (adjustment factor multiplied by target payout), and $b_2 = 1 - b$ (one minus adjustment factor).

14. Hastings, *op.cit.*, p.370.

NOTES

Hence companies in India may supplement cash dividend by bonus issues. Issuing bonus shares increases the number of outstanding shares of the company. The bonus shares are distributed proportionately to the existing shareholder. Hence there is no dilution of ownership. For example, if a shareholder owns 100 shares at the time when a 10 per cent (i.e., 1:10) bonus issue is made, she will receive 10 additional shares. The declaration of the bonus shares will increase the paid-up share capital and reduce the reserves and surplus (retained earnings) of the company. The total net worth (paid-up capital plus reserves and surplus) is not affected by the bonus issue. In fact, a bonus issue represents a recapitalisation of reserves and surplus. It is merely an accounting transfer from reserves and surplus to paid-up capital. The following example illustrates this point.

Illustration 10.1: The Effect of Bonus Share

The following is the capital structure of Walchand Sons & Company

Walchand pays bonus shares in 1:10 ratio. At the time of the issue of bonus shares, the market price per share is Rs 30. The bonus shares are issued at the market price - a premium of Rs 20 over the face value of Rs 10 each share.

	Rs in crore
Paid-up share capital (1crore shares, Rs 10 par)	10
Share premium	15
Reserves and surpluses	8
Total net worth	33

A 1:10 bonus issue implies an issue of 10 lakh new shares to the existing shareholders. Thus, a shareholder holding 10 shares shall get one additional share. At a price of Rs 30 per share, the total value of new shares issued will be Rs 3 crore. This amount would be transferred from the reserves and surplus account into the paid-up share capital account and the share premium account. The share capital account will be increased by Rs 1 crore (10 lakh × Rs 10) and the remaining Rs 2 crore will be transferred to the share premium account. The new capitalisation will be as follows:

	Rs in crore
Paid-up share capital (1.10 crore shares, Rs 10 par)	11
Share premium	17
Reserves and surpluses	5
Total net worth	33

Notice that the total net worth of the company does not change by the bonus shares; only the balance of the paid-up share capital is readjusted.

Does the issue of bonus shares increase the wealth of shareholders? Normatively speaking, the issue of bonus shares does not affect the wealth of shareholders. The earnings per share and market price per share will fall proportionately to the bonus issue. For example, as a result of increasing the number of shares by 10 per cent, the earnings per share of Walchand Company will decrease by 10 per cent. The market price per share will also fall by 10 per cent, all other things being equal. Suppose the net earnings of the company are Rs 2.20 crore. The earnings per share before the declaration of the bonus issue is Rs 2.20 (Rs 2.20 crore/1.00 crore) and after the bonus shares, the earnings per share are Rs 2 (Rs 2.20 crore/1.10 crore). However, the proportional earnings of shareholders will remain unchanged. Thus, the total earnings of a shareholder holding 100 shares before the bonus shares is Rs 220 (Rs 2.20 × 100) and his total earning will still be Rs 220 after the bonus issue (Rs 2.00 × 110). Similarly, the market price per share will drop by Rs 2.73; that is, Rs 30 (1 – 1.00/1.10). The total market value of the shareholder's holdings after the bonus shares is Rs 3,000 (Rs 27.27 × 110), same as the total value before the bonus shares. Thus, the bonus shares have no impact on the wealth of shareholders. In practice, it is observed that, immediately after the announcement of bonus issue, the market price of a company's share changes depending on the investor's expectations. Sometimes a sharp decline in the share price may be observed if the bonus issue falls short of the investors' expectation.

It may be emphasised here that the market value of the share may improve as a result of the bonus issue if it is followed by increased dividends in the immediate future. If the dividends do not increase, it is likely that the market price may fall. This is confirmed by an empirical study conducted under the Indian context.[15]

15. Gupta, L.C., *Bonus Shares*, Macmillan Co. of India Ltd.

10.6.3 Advantages of Bonus Shares

Prima facie the bonus shares do not affect the wealth of the shareholders. In practice, however, it carries certain advantages both for shareholders and the company.[16]

NOTES

Shareholders The following are advantages of the bonus shares to shareholders:

Tax benefit One of the advantages to shareholders in the receipt of bonus shares is the beneficial treatment of such dividends with regard to income taxes. When a shareholder receives cash dividend from company, this is included in his ordinary income and taxed at ordinary income tax rate. But the receipt of bonus shares by the shareholder is not taxable as income. Further, the shareholder can sell the new shares received by way of the bonus issue to satisfy his desire for income and pay capital gain taxes, which are usually less than the income taxes on the cash dividends. The shareholder could sell a few shares of his original holding to derive capital gains. But selling the original shares are considered as a sale of asset by some shareholders. They do not mind selling the shares received by way of the bonus shares as they consider it a windfall gain and not a part of the principal. Note that in India as per the current law investors do not pay any taxes on dividends but they have to pay tax on capital gains. Hence, the Indian law makes bonus shares less attractive than dividends.

Indication of higher future profits The issue of bonus shares is normally interpreted by shareholders as an indication of higher profitability. When the profits of a company do not rise, and it declares a bonus issue, the company will experience a dilution of earnings as a result of the additional shares outstanding. Since a dilution of earnings is not desirable, directors usually declare bonus shares only when they expect rise in earnings to offset the additional outstanding shares. Bonus shares, thus, may convey some information that may have a favourable impact on value of the shares. But it should be noticed that the impact on value is that of the growth expectation and not the bonus shares per se.

Future dividends may increase If a company has been following a policy of paying a fixed amount of dividend per share and continues it after the declaration of the bonus issue, the total cash dividends of the shareholders will increase in the future. For example, a company may be paying a Re 1 dividend per share and pays 1:1 bonus shares with the announcement that the cash dividend per share will remain unchanged. If a shareholder originally held 100 shares, he will receive additional 100 shares. His total cash dividend in future will be Rs 200 (Rs 1×200) instead of Rs 100 (Re 1×100) received in the past. The increase in the shareholders' cash dividend may have a favourable effect on the value of the share. It should be, however, realised that the bonus issue per se has no effect on the value of the share; it is the increase in earnings from the company's invests that affects the value.

Psychological value The declaration of the bonus issue may have a favourable psychological effect on shareholders. The receipt of bonus shares gives them a chance to sell the shares to make capital gains without impairing their principal investment. They also associate it with the prosperity of the company. Because of these positive aspects of the bonus issue, the market usually receives it positively. The sale of the shares, received by way of the bonus shares, by some shareholders widens the distribution of the company's shares. This tends to increase the market interest in the company's shares; thus supporting or raising its market price.

Company The bonus share is also advantageous to the company. The advantages are:

Conservation of cash The declaration of a bonus issue allows the company to declare a dividend without using up cash that may be needed to finance the profitable investment opportunities within the company. The company is, thus, able to retain earnings and at the same time satisfy the desires of shareholders to receive dividend. We have stated earlier that directors of a company must consider the financial needs of the company and the desires of shareholders

16. For a discussion of pros and cons of bonus shares (stock dividend), see Gupta, *op. cit.*, Porterfield, J.T.S., Dividends, Dilution and Delusion, *Harvard Business Review*, 37 (Nov.–Dec. 1959), pp. 156–57; Barker, C.A., Evaluation of Stock Dividends, *Harvard Business Review*, 36 (July–August 1958); Eismann, P.C. and Moser, E.A., Stock Dividends: Management's View, *Financial Analysis Journal*, (July–Aug. 1978), pp. 77–80.

NOTES

while making the dividend decision. These two objectives are often in conflict. The use of bonus issue represents a compromise which enables directors to achieve both these objectives of a dividend policy. The company could retain earnings without declaring bonus shares issue. But the receipt of bonus shares satisfies shareholders psychologically. Also, their total cash dividend can increase in future, when cash dividend per share remains the same. Note that in India, bonus shares cannot be issued in lieu of dividends; hence the cash conservation argument for issuing bonus shares is not a strong argument.

Only means to pay dividend under financial difficulty and contractual restrictions In some situations, even if the company's intention is not to retain earnings, the bonus issue (with a small amount of dividend) is the only means to pay dividends and satisfy the desires of shareholders. When a company is facing a stringent cash situation, the only way to replace or reduce cash dividend is the issue of bonus shares. The declaration of the bonus issue under such a situation should not convey a message of the company's profitability, but financial difficulty. The declaration of the bonus issue is also necessitated when the restrictions to pay the cash dividend are put under loan agreements. Thus, under the situations of financial stringency or contractual constrain in paying cash dividend, the bonus issue is meant to maintain the confidence of shareholders in the company.

More attractive share price Sometimes the intention of a company in issuing bonus shares is to reduce the market price of the share and make it more attractive to investors. If the market price of a company's share is very high, it may not appeal to small investors. If the price could be brought down to a desired range, the trading activity would increase. Therefore, the bonus issue is used as a means to keep the market price of the share within a desired trading range. As we shall discuss below, this objective can also be achieved by share split.

10.6.4 Limitations of Bonus Shares

Bonus shares have the following limitations:

- Shareholders' wealth remains unaffected
- Costly to administer
- Problem of adjusting EPS and P/E ratio

Bonus shares are considered valuable by most shareholders. But they fail to realise that the bonus shares do not affect their wealth and therefore, in itself it has no value for them. The declaration of bonus shares is a method of capitalising the past earnings of the shareholders. Thus, it is a formal way of recognising something (earnings), which the shareholders already own. It merely divides the ownership of the company into a large number of share certificates. Bonus shares represent simply a division of corporate pie into a large number of pieces.[17] In fact, the bonus issue does not give any extra or special benefit to a shareholder. His proportionate ownership in the company does not change. The chief advantage of the bonus share issue is that it has a favourable psychological impact on shareholders. The issue of bonus shares gives an indication of the company's growth to shareholders. Shareholders welcome the distribution of bonus shares since it has informational value.

The disadvantage of bonus issues from the company's point of view is that they are *more costly to administer* than cash dividend.[18] The company has to now print certificates and post them to thousands of shareholders. The bonus issue can be disadvantageous if the company declares periodic small bonus shares. The investment analysts do not adjust the earnings per share for small issues of bonus shares. They adjust only the significant issues of bonus shares. When the earnings per share are not adjusted, the measured growth in the earnings per share will be less than the true growth based on the adjusted earnings per share. As a result the price–earnings ratio would be distorted downwards.

17. Porterfield, James, T.S., Dividend, Dilution and Delusion, *Harvard Business Review*, November–December 1959, pp. 156–61.
18. Van Horne, James, C., *Financial Management and Policy*, Prentice-Hall of India, 1971, p. 277.

10.6.5 Conditions for the Issue of Bonus Shares

NOTES

In India, bonus shares are issued in addition to, and not in lieu of, cash dividends. A company is not allowed to declare bonus shares unless partly paid-up shares have been converted into fully paid-up shares. Bonus shares are made out of share premium and free reserve, which includes investment allowance reserve but excludes capital reserve on account of assets revaluation. In no time the amount of bonus issue should exceed the paid-up capital. A company can declare bonus shares once in a year. The company's shareholders should pass a resolution approving the proposal of the bonus issue, clearly indicating the rate of dividend is payable on the increased capital. Company intending to issue bonus shares should not be in default of payments of statutory dues to employees and term loans to financial institutions.

The maximum bonus shares ratio is 1:1; that is, one bonus share for one fully paid-up share held by the existing shareholders. However, two criteria are required to be satisfied within the limit of the maximum ratio. They are:

- Residual reserve criterion
- Profitability criterion.

Residual reserve criterion It requires that reserve remaining after the amount capitalised for bonus issue should be at least equal to 40 per cent of the increased paid-up capital. Redemption reserve and capital reserve on account of assets revaluation are excluded while investment allowance reserve is included in computing the minimum residual reserve. This criterion can be expressed as follows:

$$\begin{aligned}&(\text{Pre-bonus reserve}) - \text{Pre-bonus paid-up capital}\\ &\times \text{Bonus ratio} \geq 0.4\,(1 + \text{Bonus ratio})\\ &\times \text{Pre-bonus paid-up capital}\end{aligned} \tag{5}$$

Profitability criterion It requires that 30 per cent of the previous three years' average pre-tax profit (PBT) should be at least equal to 10 per cent of the *increased* paid-up capital. This criterion can be expressed as follows:

$$\begin{aligned}&0.3 \times \text{three year average PBT} \geq 0.1(1 + \text{bonus ratio})\\ &\times \text{pre–bonus paid-up capital}\end{aligned}$$

Consider an example. A company has the following data:

	Rs
Paid-up share capital	80
Reserves	100
Net worth	180
Average PBT of previous three years	50

We can plug these data respectively in Equations (1) and (2) as follows to determine the maximum bonus ratio:

Residual reserve criterion

$$\begin{aligned}100 - (80 \times \text{Bonus ratio}) &\geq 0.4(1 + \text{Bonus ratio}) \times 80\\ 100 - (80 \times \text{Bonus ratio}) &\geq 32 + 32 \times \text{Bonus ratio})\\ 68 &\geq 112 \times \text{Bonus ratio}\\ 68/112 &\geq \text{Bonus ratio or } 17{:}28 \text{ Bonus ratio}\end{aligned}$$

Profitability criterion

$$\begin{aligned}0.3 \times 50 &\geq 0.1(1 + \text{Bonus ratio}) \times 80\\ 15 &\geq 8 + 8 \times \text{Bonus share}\\ 7 &\geq 8 \times \text{Bonus ratio}\\ 7/8 &\geq \text{Bonus ratio or } 7 : 8 \text{ Bonus ratio}\end{aligned}$$

NOTES

Note that 68/112 is less than 7/8. Therefore, the company will be allowed to declare bonus issue in the ratio of 68:112 (or 17:28). The increased paid-up capital and residual reserve will be as follows:

	Rs
Paid-up share capital (80 + 80 × 17/28)	128.57
Reserve (100 – 80 × 17/28)	51.43
	180.00

You may notice that residual reserve (Rs 51.43) is 40 per cent of the increased paid-up capital (Rs 128.57).

10.7 SHARE SPLIT

A **share split** is a method to increase the number of outstanding shares through a proportional reduction in the par value of the share. A share split affects only the par value and the number of outstanding shares; the shareholders' total funds remain unaltered. Consider an example.The following is the capital structure of Walchand Sons & Company

	Rs
Paid-up share capital (1 crore Rs 10 par)	10
Share premium	15
Reserves and surplus	8
Total net worth	33

Walchand Company split their shares two-for-one. The capitalisation of the company after the split is as follows:

	Rs
Paid-up share capital (2 crore Rs 5 par)	10
Share premium	15
Reserves and surplus	8
Total net worth	33

10.7.1 Bonus Share vs. Share Split

As with the bonus share the total net worth does not change and the number of outstanding shares increases substantially with the share split. The bonus issue and the share split are similar except for the difference in their accounting treatment. In the case of bonus shares, the balance of the reserves and surpluses account decreases due to a transfer to the paid-up capital and the share premium accounts. The par value per share remains unaffected. With a share split, the balance of the equity accounts does not change, but the par value per share changes. The earnings per share will be diluted and the market price per share will fall proportionately with a share split. But the total value of the holdings of a shareholder remains unaffected with a share split.

10.7.2 Reasons for Share Split

The following are reasons for splitting of a firm's ordinary shares:[19]

Check Your Progress

9. What are major ways of making payments to shareholders?
10. What is the effect of issuing bonus shares to existing shareholders? What are the advantages?
11. Write a brief note on bonus shares?
12. What are the various forms of dividends?

19. Hausman, W.H., *et. al.*, Stock Splits, Price Changes and Trading Profit: A Synthesis, *Journal of Business*, 44 (Jan. 1971), pp. 69–77. Also see Barker, C.A., Effective Stock Splits, *Harvard Business Review*, 34 (Jan.–Feb. 1956) pp. 101–06.

- To make trading in shares attractive
- To signal the possibility of higher profits in the future
- To give higher dividends to shareholders

To make shares attractive The main purpose of a stock split is to reduce the market price of the share in order to make it attractive to investors. With reduction in the market price of the share, the shares of the company are placed in a more popular trading range. For example, if the shares of a company are sold in the lots of 100 shares, it requires Rs 10,000 to buy 100 shares selling for Rs 100 per share. A five-for-one split would lower the price to Rs 20 per share and the total cost of 100 shares to Rs 2,000. The wealthy investor can still purchase shares of Rs 10,000 by acquiring a larger number of shares (500 share at Rs 20). But a small investor can also afford to buy 100 shares for Rs 2,000 for which she otherwise needed Rs 10,000 before the split. Thus, the reduction in the market price, caused by the share split, motivates more investors, particularly those with small savings, to purchase the shares. This helps in increasing the marketability and liquidity of a company's shares.

Indication of higher future profits The share splits are used by the company management to communicate to investors that the company is expected to earn higher profits in future. The market price of high-growth firm's shares increases very fast. If the shares are not split periodically, they fall outside the popular trading range. Therefore, these companies resort to share splits from time to time. The share split like bonus shares, thus, has an informational value that the firm is expected to perform efficiently and profitably and that the shares have been split to avoid future high price per share.

Increased dividend When the share is split, seldom does a company reduce or increase the cash dividend per share proportionately. However, the total dividends of a shareholder increase after a share split. For example, a company may be paying a cash dividend of Rs 3 per share before the share split. But after a split of three-of-one, the company may pay a cash dividend of Rs 1.50 per share. A shareholder holding 100 shares before the split will receive a total cash dividend of Rs 300. The number of shares owned by the shareholder will increase to 300 after the split and his total cash dividend will be Rs 450. The increased dividends may favourably affect the after-split market price of the share. It should be noted that the share split per se has no effect on the market price of share.

10.7.3 Reverse Split

Under the situation of falling price of a company's share, the company may want to reduce the number of outstanding shares to prop up the market price per share. The reduction of the number of outstanding shares by increasing per share par value is known as a **reverse split**. For example, a company has 20 lakh outstanding shares of Rs 5 par value per share. Suppose it declares a reverse split of one-for-four. After the split, it will have 5 lakh shares of Rs 20 par value per share. The reverse split is sometimes used to stop the market price per share below a certain level, say, Rs 10 per share which is par value of most shares in India. The reverse split is generally an indication of financial difficulty, and is, therefore, intended to increase the market price per share.[20]

10.8 DIVIDEND POLICY ANALYSIS: CASE OF (L&T) LIMITED

We have already analysed in earlier chapters L&T's cost of capital and capital structure, respectively. In this section, we shall analyse L&T's dividend policy. Table 10.1 provides financial data for L&T from the year 1990 to the year 2003.

NOTES

Check Your Progress

13. What is meant by a share split? What are the advantages of a share split?
14. Discuss in brief some of the main reasons for share splitting?

20. West, R.R. and Brouilette, A.B., Reverse Stock Splits, *Financial Executives*, 38 (Jan. 1970), pp. 12–17.

NOTES

Table 10.1: L&T's EPS, DPS and other financial data

Year	EPS Rs	DPS Rs	Payout %	P/E times	DY %	EY %	Price Rs
Mar–90	6.3	2.3	37.2	13.0	3.1	7.7	82.0
Mar–91	9.4	3.0	31.8	12.0	2.7	8.3	112.5
Mar–92	7.8	2.4	30.8	49.9	0.9	2.0	390.1
Mar–93	5.6	3.3	57.6	31.5	2.0	3.2	177.7
Mar–94	9.2	4.0	44.0	29.4	1.5	3.4	269.9
Mar–95	12.1	4.8	39.5	21.5	1.9	4.7	259.9
Mar–96	13.4	5.6	41.4	18.0	2.5	5.6	242.1
Mar–97	16.6	6.0	36.3	12.1	3.0	8.3	199.9
Mar–98	21.4	6.5	30.4	11.4	2.7	8.8	243.0
Mar–99	18.9	6.5	34.4	12.4	2.8	8.1	233.9
Mar–00	13.7	6.5	47.4	20.9	2.3	4.8	287.4
Mar–01	8.9	6.5	73.5	25.0	2.9	4.0	221.2
Mar–02	16.5	7.0	42.5	11.0	3.9	9.1	180.8
Mar–03	17.4	7.5	43.1	10.6	4.1	9.4	184.7
Average	12.7	5.1	42.2	19.9	2.6	6.2	220.4

Behaviour of EPS, DPS and payout L&T's EPS has grown faster than its DPS. EPS has shown wide fluctuations, while DPS has been slowly and steadily growing (Figure 10.3).

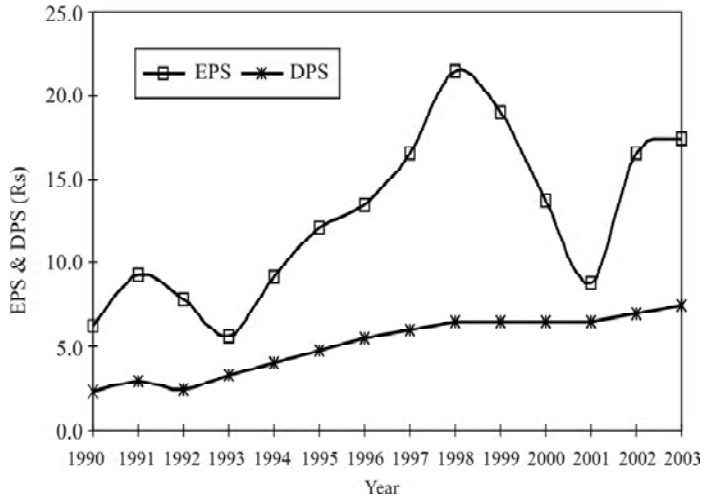


Figure 10.3: L&T's EPS and DPS during 1990–2003

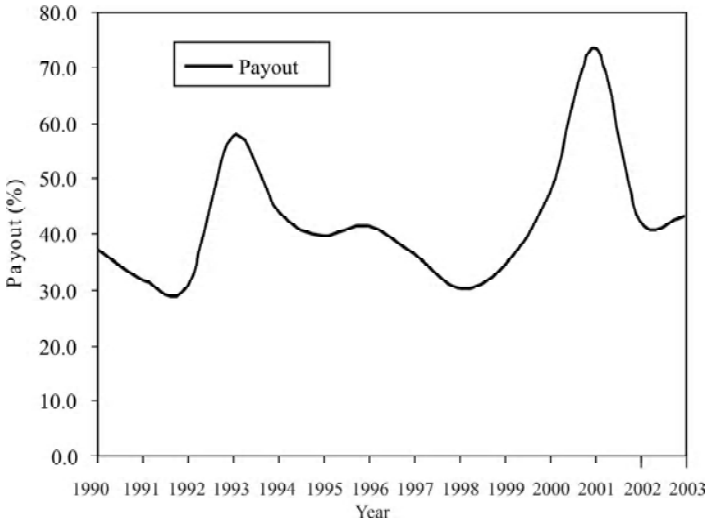


Figure 10.4: L&T's Payout Ratio, 1990–2003

Consequently, dividend payout ratio shows wide variations—ranging between 30 per cent in 1992 to 74 per cent in 2001 (Figure 10.4). The average payout during 1990 to 2003 is 42 per cent.

Behaviour of share price Figure 10.5 shows that L&T's share price after reaching peak in 1992 (the year of stock scam in india), has been fluctuating within a narrow range. There does seem to be significant correlation between L&T's share price and EPS or DPS or payout ratio.

NOTES

Earnings and dividend yields L&T's dividend yield declined from 1990 to 1993, and after that , it has been increasing except in 1994 and 2000. It has, however, remained below 3 per cent. The average dividend yield from 1990 to 2003 is 2.6 per cent. L&T's earnings yield showed a high degree of variability (Figure 10.6). It peaked to 9.4 per cent in 2003. The average earnings yield during 1990 to 2003 was 6.2 per cent.

Target payout We can use Lintner's model to explain L&T's dividend behaviour. We obtained the following results when we regressed DIV_t (we use the term DIV for DPS) with EPS_t and DIV_{t-1}.

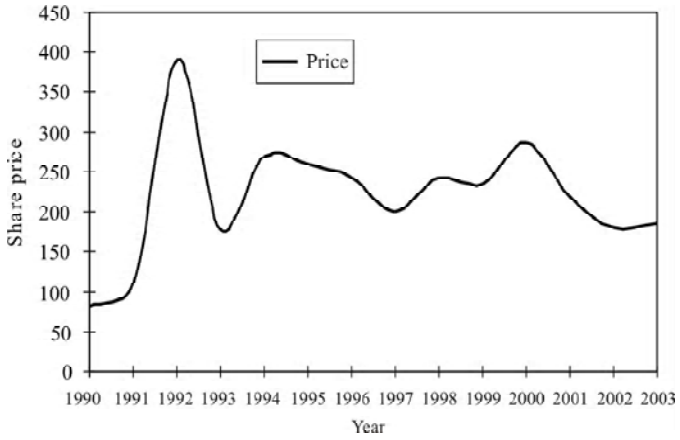


Figure 10.5: L&T's Share Price Behaviour, 1990–2003

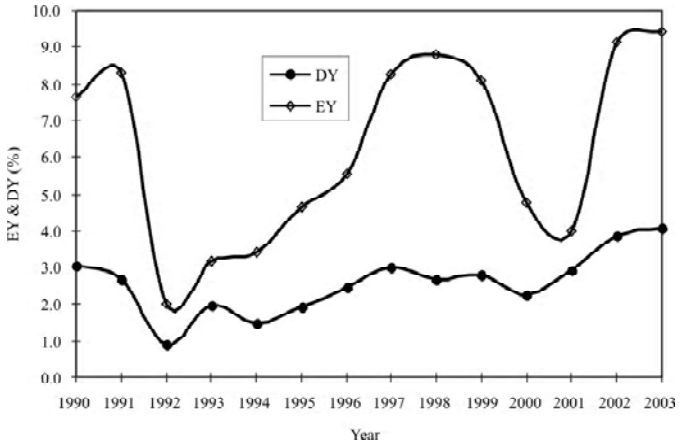


Figure 10.6: L&T's Earnings and dividend yield

$$DIV_t = a + b_1 EPS_t + b_2 DIV_{t-1} + e_t$$

$$DIV_t = 0.620 + 0.039EPS_t + 0.851 DIV_{t-1}$$

It may be seen from the results that L&T's dividend decision is influenced much more by the past dividend than by current EPS. Assuming that L&T's expected EPS in 2004 is Rs 20, then, the expected dividend per share will be:

$$DIV_{2004} = 0.620 + 0.039 \times 20 + 0.851 \times 7.5 = \text{Rs } 7.8$$

We may recall that the target payout ratio, DIV* = pEPS. Therefore, the coefficient $b_1 = 0.039 = bp$ (where p is the target payout and b is the speed of adjustment factor) and the coefficient $b_2 = 0.851 = 1 - b$. Thus the value of b (adjustment factor) and p (target payout) is given as follows:

NOTES

$$bp = 0.039$$
$$1 - b = 0.851$$
$$b = 1 - 0.851 = 0.149$$
$$0.149p = 0.039$$
$$p = 0.039 / 0.149 = 0.26$$

L&T's empirically determined target payout is 26 per cent. However, Its actual average payout during 1990-2003 is 42 per cent.

10.10 LET US SUMMARIZE

- Dividends may take two forms: cash dividend and bonus shares (stock dividend). In India, bonus shares cannot be issued in lieu of cash dividends. They are paid with cash dividends.
- Bonus shares have a psychological appeal. They do not increase the value of shares.
- Companies generally prefer to pay cash dividends. They finance their expansion and growth by issuing new shares or borrowing. This behaviour is based on the belief that shareholders are entitled to some return on their investment.
- Most companies have long-term payment ratio targets. But they do not apply target payout ratios to each year's earnings. They try to stabilise dividend payments by moving slowly towards the target payout each year.
- Also, they consider past dividends and current as well as future earnings in determining dividend payment. Investors recognise this. Any extreme changes are read as signals of management's expectations about the company's performance in future. Thus dividends have information contents.
- Companies like to follow a stable dividend policy since investors generally prefer such a policy for the reason of certainty.
- A stable dividend policy does not mean constant dividend per share. It means reasonably predictable dividend policy. Companies determine dividend per share or dividend rate keeping in mind their long-term payout ratio.
- The firm's ability to pay dividend depends on its funds requirements for growth, shareholders' desire and liquidity. A growth firm should set its dividend rate at a low level (because of its high needs for funds) and move towards its target slowly.
- In addition to cash dividends, companies issue bonus shares to shareholders. Bonus shares have no real economic gain; it has psychological value and information content.
- Shareholders expect that the company in the future will improve its performance and it will apply dividend rate to the enhanced capital. In this hope the price may increase. If the actual experience is poor performance and no increase in dividends, share will decline. Share split has the same effect as the bonus shares.

10.10 KEY CONCEPTS

Bonus	Target payout	Clientele effect
Dividend	Dividend equalisation reserve	Dividend safety factor
Dividend smoothing	Dividend stability	Reserve share split
Residual dividend theory	Speed of adjustment factor	Stock dividend

10.11 ILLUSTRATIVE SOLVED PROBLEMS

NOTES

Problem 10.1: Two companies—Alpha Ltd. and Beta Ltd. are in the same industry with identical earnings per share for the last five years. The Alpha Ltd. has a policy of paying 40 per cent of earnings as dividends, while the Beta Ltd. pays a constant amount of dividend per share. There is disparity between the market prices of the shares of the two companies. The price of Alpha's share is generally lower than that of Beta, even though in some years Alpha paid more dividends than Beta. The data on earnings, dividends and market price for the two companies are as under:

Alpha Ltd.

Year	*EPS* *Rs*	*DPS* *Rs*	*Market Price* *Rs*
2000	4.00	1.60	12.00
2001	1.50	0.60	8.50
2002	5.00	2.00	13.50
2003	4.00	1.60	11.50
2004	8.00	3.20	14.50

Beta Ltd.

Year	*EPS* *Rs*	*DPS* *Rs*	*Market Price* *Rs*
2000	4.00	1.80	13.50
2001	1.50	1.80	12.50
2002	5.00	1.80	12.50
2003	4.00	1.80	12.50
2004	8.00	1.80	15.00

(*i*) Calculate (*a*) payout ratio, (*b*) dividend yield and (*c*) earning yield for both the companies.

(*ii*) What are the reasons for the differences in the market prices of the two companies' shares?

(*iii*) What can be done by Alpha Limited to increase the market price of its shares?

Solution

(*i*) The following table shows payout, dividend yield and earnings yield for Alpha and Beta.

	Payout		*Dividend Yield*		*Earnings Yield*	
Year	*Alpha*	*Beta*	*Alpha*	*Beta*	*Alpha*	*Beta*
2000	0.40	0.45	0.13	0.13	0.33	0.30
2001	0.40	1.20	0.07	0.14	0.18	0.12
2002	0.40	0.36	0.15	0.14	0.37	0.40
2003	0.40	0.45	0.14	0.44	0.35	0.32
2004	0.40	0.23	0.22	0.12	0.55	0.53

(*ii*) It seems that investors evaluate the shares of these two companies in terms of dividend payments. The average dividend per share over a period of five years for both the firms is Rs 1.80. But the average market price for Beta Ltd. (Rs 13.20) has been 10 per cent higher than the average market price for Alpha Ltd. (Rs 12). The market has used a higher capitalisation rate to discount the fluctuating dividend per share of Alpha Ltd., thus valuing the shares of Alpha Ltd. at a lower price than that of the Beta Ltd.

(*iii*) It is obvious that the market evaluates these firms in terms of dividends. A higher market price might be obtained for the shares of Alpha Ltd., if it increases its dividend payout ratio. The company should evaluate this option in light of funds requirements.

NOTES

Problem 10.2: The Sisodia Ltd. is a fast growing manufacturing firm. It earns above industry return on its investment. It has been earning a rate in excess of 25 per cent on its investments in the past and has good prospects of earnings at the same rate in future as well. The Sisodia Ltd. has been following a dividend policy of paying 70 per cent of the earnings to shareholders and retaining 30 per cent. This dividend policy is justified on the grounds that the sole objective of a company is to pay dividends and that dividends have a positive impact upon the price of the share.

If most of the company's shareholders are young wealthy persons in high tax brackets, is the current dividend policy of the company justified?

Solution:

The current dividend policy of the company is not justified on two grounds: (*i*) the company is earning a high rate of return on its investment, which shareholders are unlikely to earn themselves, and (*ii*) shareholders are wealthy persons in high tax brackets; therefore, they would prefer greater retention (which should result in future capital gains) than is being presently done by the company. The current dividend policy results into a growth of $0.25 \times 0.3 = 0.075$ or 7.5 per cent only. If the company retains more, say 70 per cent, its growth rate would be $0.25 \times 0.7 = 0.175$ or 17.5 per cent which would reflect in high share price. Thus, shareholders can earn high capital gains on which tax rate is lower than the ordinary income. Though a company may exist for the purpose of paying dividends in the long-run, if it can currently earn more than shareholders, the retention ratio should be quite high. Since the company is growing at an above-average rate, it is likely that the market price of the company's shares is lower than it might be with higher retention.

10.12 ANSWERS TO 'CHECK YOUR PROGRESS'

1. A firm's net earnings can be divided into two parts: retained earnings and dividends. The firm can use the retained earnings to finance its long term growth. On the other hand, the shareholders also want to have some money in hand, which is possible only when cash dividend is paid. The shareholders may prefer dividends now, rather than dividends or capital gains at a later date. The management of the firm, while deciding on a dividend policy, has to strike a balance between these two alternatives.
2. In this approach, the firm's requirements are seen as primary. Dividends will be paid only if the firm does not have profitable investment opportunities. Of course fresh equity may be raised to finance new opportunities. However, retained earnings are preferred over fresh equity as floatation costs are not there in the case of retained earnings. This approach also assumes that shareholders prefer wealth maximisation rather than current dividends.
3. Usually these two types of companies follow different dividend policies. Mature companies usually have fewer investment opportunities, and hence often follow high dividend payout ratios. On the other hand, growth companies have plenty of investment opportunities and hence usually follow a low payout ratio.
4. Yes, dividend expectations vary among shareholders. For example, a wealthy shareholder may prefer capital gains rather than current dividends. In contrast, a retired person may prefer a higher quantum of current regular dividends. Institutional investors, who buy shares in bulk and hold them for relatively long periods of time, are not so concerned about personal income taxes but with profitable investments. They prefer a policy of regular cash dividend payments.
5. The firm's decision to pay dividends may be affected by the following two possible view points
   (a) Firm's need for future funds
   (b) Shareholder's need for income
6. A stable dividend policy has a number of advantages. First, it accepts that shareholders usually require a certain amount of current income. Second, the investors' uncertainty re-

NOTES

garding income is removed. For example, the investor knows that once the dividend rate has been raised, it means that the management is confident of maintaining the raised level of dividend payout for some time. Further, a stable dividend policy usually satisfies the requirement of institutional investors. Raising additional finances also become easier as a stable and regular dividend policy provides positive signals to the market and prospective investors. However, one disadvantage of following a stable dividend policy is that once a dividend payout rate is established, any reduction would send out very negative signals to the market.

7. The greatest danger in adopting a stable dividend policy is that once it is established, it cannot be changed without affecting investor's attitude and the financial standing of the company.
8. Lintner's study found that firms usually consider a dividend policy in terms of proportion of earnings to be paid out. Investment requirements are not considered for modifying the dividend behaviour pattern. Firms therefore generally have target payout ratios in mind while determining change in dividend per share.
9. The most common method of payment to shareholders is distribution of dividends in cash. Another way of rewarding shareholders is to issue bonus shares free of cost to the existing shareholders. The third method is for companies to buy back shares from existing shareholders and thus lower the number of shares issued.
10. The total net worth of a company is not increased by the issue of bonus shares. It is an accounting transfer from reserves and surplus to paid-up capital. Bonus shares therefore do not increase the economic gain to shareholders; however issuance of bonus shares has psychological value and information content as the indication is that future dividends may increase. As bonus shares are issued to existing shareholders proportionately, there is no dilution of ownership. However, instead of earning dividend, the shareholder has the option of selling the bonus shares in the market and making capital gains. The difference in taxation treatment of dividend and capital gains would decide which is better to shareholders from a taxation point of view. In the case of bonus shares there is no outgo of cash in the case of bonus shares unlike cash dividend payment. Finally, a bonus issue may make the share price more attractive for shareholders.
11. Bonus share is a form of payment of dividend. An issue of bonus shares is the distribution of shares free of cost to the existing shareholders.
12. The usual form of dividend payment are:

    (a) Cash dividend (b) Bonus Shares
13. A share split is a method to increase the number of outstanding shares through a proportional reduction in the par value of shares of a company. By lowering the par value, the shares become more attractive as the market trading range is lowered. A share split is also often used by the management of the company to indicate to the market that profits of the company will continue to increase in future. Also often it is observed that a company does not reduce the dividend proportionately after a stock split.
14. Some of the main reasons for splitting a firm's shares are:

    (a) To make trading in shares attractive (b) Indication of higher future profits

    (c) To give higher dividends to the shareholders

10.13 QUESTIONS AND EXERCISES

Review Questions

1. Explain the nature of the factors which influence the dividend policy of a firm.
2. 'The primary purpose for which a firm exists is the payment of dividend. Therefore, irrespective of the firm's needs and the desires of shareholders, a firm should follow a policy of very high dividend payout.' Do you agree? Why or why not?

NOTES

3. What are the factors that influence management's decision to pay dividend of a certain amount?
4. What is a stable dividend policy? Why should it be followed? What can be the consequences of changing a stable dividend policy?
5. How is the corporate dividend behaviour determined? Explain Lintner's model in this regard.
6. What are the different payout methods? How do shareholders react to these methods?
7. What is a bonus issue or stock dividend? What are its advantages and disadvantages?
8. Explain a stock split? Why is it used? How does it differ from a bonus shares?
9. 'Bonus shares represent simply a division of corporate pie into a large number of pieces.' Explain.
10. What are the effects of bonus issue and share split on the earnings per share and the market price of the share?

Exercises

1. B. Das Co. has been a fast-growing firm and has been earning very high return on its investment in the past. Because of the availability of highly profitable investment internally, the company has been following a policy of retaining 70 per cent of earnings and paying 30 per cent of earnings as dividends. The company has now grown matured and does not have enough profitable internal opportunities to reinvest its earnings. But it does not want to deviate from its past dividend policy on the ground that investors have been accustomed to it and any change may not be welcome by them. The company, thus, invests retained earnings in the short-term government securities. Is the company justified in following the current dividend policy? Give reasons to support your answer.
2. D. Damodar Co. is a fast-growing firm in the engineering industry. In the past, the firm has earned a return of 25 per cent on its investments and this trend is likely to continue. The firm has been retaining 25 per cent of its earnings and paying 75 per cent of earnings as dividends. This policy has been justified on the grounds that dividends are generally preferred over retained earnings by shareholders.

   Is the current dividend policy justified if most of the shareholders are wealthy persons in high tax brackets? Will your answer change if most of the shareholders of the company were (*a*) retired persons with no other source of income and (*b*) the financial institutions?
3. The following data relate to the Brown Limited and the Crown Limited which belong to the same industry and sell the same product:

Brown Ltd.

			Market Price		
Year	***EPS***	***DPS***	***High***	***Low***	***Book value***
Rs	***Rs***	***Rs***		***Rs***	***Rs****
2000	3.60	2.00	48	52	37.20
2001	3.90	2.00	53	34	38.80
2002	3.70	2.00	51	30	40.60
2003	3.20	2.00	59	31	42.30
2004	3.80	2.00	60	35	43.20

*The face value per share is Rs 10.

Crown Ltd.

			Market Price		
Year	*EPS*	*DPS*	*High*	*Low*	*Book value*
Rs	*Rs*	*Rs*		*Rs*	*Rs**
2000	3.50	1.75	38	34	30.50
2001	3.00	1.50	42	32	32.50
2002	2.50	1.25	42	28	33.75
2003	6.00	3.00	50	30	36.50
2004	5.00	2.50	48	27	38.50

*The face value per share is Rs 10.

Calculate payout ratio, dividend yield, earnings yield and price–earning ratio. Which company is more profitable? Explain the reason for the difference in the market prices of the two companies' shares.

4. A multinational pharmaceutical company in India has following information about its EPS and dividends payment from 1987 to 2004.

You are required to answer the following questions: (*a*) What minimum annual percentage dividend increase the company intends to give to its shareholders? (*b*) Is there any relationship between the earnings increase and the rise in dividends? (*c*) Do you think that the company has a long-term target payout ratio? (*d*) The company's payout in 2003 was 150 per cent. How will you explain this? (*e*) What clientele does the company have?

Year	*EPS Rs*	*Change in EPS (%)*	*DPS Rs*	*Change in DPS (%)*	*Payout (%)*
1987	13.9	–7.2	5.3	11.7	37.9
1988	15.9	14.2	5.9	11.7	37.0
1989	16.4	3.1	6.5	10.5	39.7
1990	18.4	12.8	7.4	14.3	40.2
1991	19.8	7.4	8.3	11.7	41.8
1992	23.6	19.3	9.4	13.4	39.7
1993	24.7	4.7	10.5	11.8	42.4
1994	25.9	4.5	11.5	9.4	44.4
1995	27.8	7.6	13.0	12.9	46.6
1996	30.7	10.2	14.2	9.5	46.3
1997	30.1	–2.0	15.1	6.1	50.1
1998	31.2	3.7	15.9	5.7	51.1
1999	33.9	8.7	17.2	7.7	50.7
2000	34.9	2.9	19.1	11.5	54.9
2001	81.8	134.5	21.6	12.9	26.4
2002	44.9	–45.1	23.5	8.6	52.3
2003	53.6	19.5	80.5	243.1	150.1
2004	36.5	–32.0	28.2	–65.0	77.2

5. Ashoka Ltd. has a capital structure shown below:

	Rs (crore)
Equity share capital (Rs 10 par, 5 crore shares)	50
Preference share capital (Rs 100 par, 50 lakh shares)	50
Share premium	50
Reserves and surpluses	80
Net worth	230

Show the changed capital structure if the company declares a bonus issue of shares in the ratio of 1:5 to ordinary shareholders when the issue price per share is Rs 100. How would the

NOTES

capital structure be affected if the company had split its stock five-for-one instead of declaring bonus issue?

6. Polychem Co.'s current capital structure as on 31 March, 2004 is as follows:

NOTES

	Rs (crore)
Share capital (Rs 100 par, 2 crore shares)	200
Share premium	100
Reserves and surpluses	190
	490

The current market price of the company's shares is Rs 140 per share. The earnings per share for the year 2003 was Rs 17. The company has been paying a constant dividend of Rs 6.50 per share for the last ten years.

What shall be the effect on earnings per share, dividend, share price and the capital structure if the company (*i*) splits its shares two-for-one or (*ii*) declares a bonus issue of one-for-twenty?

7. Surendra Auto Limited is considering a bonus shares issue. The following data are available:

		Rs (crore)
Paid up share capital		12
Reserves		16
Previous three years' pre-tax profit	Year 1	8.0
	Year 2	8.6
	Year 3	8.3

Recommend the maximum bonus ratio. Give reasons.

UNIT 11 CORPORATE RESTRUCTURING, MERGERS AND ACQUISITIONS

NOTES

Structure

11.0 INTRODUCTION

Corporate restructuring includes mergers and acquisitions (M&A), amalgamation, take-overs, spin-offs, leveraged buy-outs, buy-back of shares, capital reorganisation, sale of business units and assets etc. M&A are the most popular means of corporate restructuring or business combinations. They have played an important role in the external growth of a number of leading companies the world over. In the United States, the first merger wave occurred between 1890 and 1904 and the second began at the end of the World War I and continued through the 1920s. The

NOTES

third merger wave commenced in the latter part of World War II and continues to the present day.[1] About two-thirds of the large public corporations in the USA have merger or amalgamation in their history. In India, about 1180 proposals for amalgamation of corporate bodies involving about 2,400 companies were filed with the High Courts during 1976–86. These formed 6 per cent of the 40,600 companies at work at the beginning of 1976.[2] In the year 2003–04, 834 mergers and acquisitions deals involved Rs 35,980 crore. Mergers and acquisitions, the way in which they are understood in the Western countries, have started taking place in India in the recent years. A number of mega mergers and hostile takeovers could be witnessed in India now.

There are several aspects relating to mergers and acquisitions that are worthy of study. Some important questions are:

1. What are the basic economic forces that lead to mergers and acquisitions? How do these interact with one another?
2. What are the manager's true motives for mergers and acquisitions?
3. Why do mergers and acquisitions occur more frequently at some times than at other times? Which are the segments of the economy that stand to gain or lose?
4. How could merger and acquisition decisions be evaluated?
5. What managerial process is involved in merger and acquisition decisions?
6. What process is followed in integrating merging and merged firms post-merger?

In this chapter, we shall also discuss other forms of corporate restructuring like takeovers, leveraged buy-outs and spin-offs.

11.1 UNIT OBJECTIVES

- Discuss the form of mergers and acquisitions
- Highlight the real motives of mergers and acquisitions
- Show how mergers and acquisitions could help creating value
- Illustrate the methodology for valuing mergers and acquisitions
- Focus on the considerations that are important in the mergers and acquisitions negotiations
- Consider the issues involved in post-merger integration
- Understand the implications and valuation of the leveraged buy-outs and disinvestment
- Explain the legal framework for mergers and acquisition in India

11.2 CORPORATE RESTRUCTURING

Corporate restructuring refers to the changes in ownership, business mix, assets mix and alliances with a view to enhance the shareholder value. Hence, corporate restructuring may involve ownership restructuring, business restructuring and assets restructuring. A company can affect **ownership restructuring** through mergers and acquisitions, leveraged buy-outs, buyback of shares, spin-offs, joint ventures and strategic alliances. **Business restructuring** involves the reorganization of business units or divisions. It includes diversification into new businesses, out-sourcing, divestment, brand acquisitions etc. **Asset restructuring** involves the acquisition or sale of assets and their ownership structure. The examples of asset restructuring are sale and leaseback of assets, securitization of debt, receivable factoring, etc.

The basic purpose of corporate restructuring is to enhance the shareholder value. A company should continuously evaluate its portfolio of businesses, capital mix and ownership and assets arrangements to find opportunities for increasing the shareholder value. It should focus on assets utilization and profitable investment opportunities, and reorganize or divest less profitable or loss making businesses/products. The company can also enhance value through capital restructuring; it can design innovative securities that help to reduce cost of capital.

1. Arthur, R., Waya, H., A Critical Study of Accounting for Business Combinations, *Accounting Research Study*, New York, American Institute of Certified Public Accountants, 1963, p. 7.
2. Bhattacharyya, H.K., Amalgamation and Takeovers, *Company News and Notes*, 1988, pp. 1–11.

Our focus here is on mergers and acquisitions, leveraged buy-outs and divestment. We have discussed many other aspects of restructuring like buyback of shares, capital structuring etc. earlier in this book.

NOTES

11.3 TYPES OF BUSINESS COMBINATION

There is a great deal of confusion and disagreement regarding the precise meaning of terms relating to the business combination, *viz*., merger, acquisition, takeover, amalgamation and consolidation. Sometimes, these terms are used in broad sense, encompassing most dimensions of business combination, while sometimes they are defined in a restricted legal sense. We shall define these terms keeping in mind the relevant legal framework in India.

11.3.1 Merger or Amalgamation

A **merger** is said to occur when two or more companies combine into one company. One or more companies may merge with an existing company or they may merge to form a new company. In merger, there is complete amalgamation of the assets and liabilities as well as shareholders' interests and businesses of the merging companies. There is yet another mode of merger. Here one company may purchase another company without giving proportionate ownership to the shareholders' of the acquired company or without continuing the business of the acquired company.[3] Laws in India use the term **amalgamation** for merger. For example, Section 2(1A) of the Income Tax Act, 1961 defines amalgamation as the merger of one or more companies (called **amalgamating company** or companies) with another company (called **amalgamated company**) or the merger of two or more companies to form a new company in such a way that all assets and liabilities of the amalgamating company or companies become assets and liabilities of the amalgamated company and shareholders holding not less than nine-tenths in value of the shares in the amalgamating company or companies become shareholders of the amalgamated company. We shall use the terms merger and amalgamation interchangeably.

Merger or amalgamation may take two forms:

- Merger through absorption
- Merger through consolidation

Absorption Absorption is a combination of two or more companies into an existing company. All companies except one lose their identity in a merger through absorption. An example of this type of merger is the absorption of Tata Fertilisers Ltd. (TFL) by Tata Chemicals Ltd. (TCL). TCL, an acquiring company (a buyer), survived after merger while TFL, an acquired company (a seller), ceased to exist. TFL transferred its assets, liabilities and shares to TCL. Under the scheme of merger, TFL shareholders were offered 17 shares of TCL (market value per share being Rs 114) for every 100 shares of TFL held by them.

Consolidation Consolidation is a combination of two or more companies into a new company. In this form of merger, all companies are legally dissolved and a new entity is created. In a consolidation, the acquired company transfers its assets, liabilities and shares to the new company for cash or exchange of shares. In a narrow sense, the terms amalgamation and consolidation are sometimes used interchangeably. An example of consolidation is the merger or amalgamation of Hindustan Computers Ltd., Hindustan Instruments Ltd., Indian Software Company Ltd., and Indian Reprographics Ltd. in 1986 to an entirely new company called HCL Ltd.

Check Your Progress

1. What are the major types of corporate restructuring?
2. What is corporate restructuring? What is its basic purpose?

11.3.2 Acquisition

A fundamental characteristic of merger (either through absorption or consolidation) is that the acquiring or amalgamated company (existing or new) takes over the ownership of other company and combines its operations with its own operations. **Acquisition** may be defined as an act of

3. ICAI, Statements of Accounting Standards (AS 14): Accounting for Amalgamation, New Delhi: ICAI. http://www.icai.org/resource/as14_defin.html

NOTES

acquiring effective control over assets or management of a company by another company without any combination of businesses or companies. A **substantial acquisition** occurs when an acquiring firm acquires substantial quantity of shares or voting rights of the target company. Thus, in an acquisition, two or more companies may remain independent, separate legal entity, but there may be change in control of companies. An acquirer may be a company or persons acting in concert that act together for the purpose of substantial acquisition of shares or voting rights or gaining control over the target company.

Takeover Generally speaking **takeover** means acquisition. A takeover occurs when the acquiring firm takes over the control of the target firm. An acquisition or take-over does not necessarily entail full, legal control. A company can have effective control over another company by holding minority ownership. Under the Monopolies and Restrictive Trade Practices Act, takeover means acquisition of not less than 25 per cent of the voting power in a company. Section 372 of the Companies Act defines the limit of a company's investment in the shares of another company. If a company wants to invest in more than 10 per cent of the subscribed capital of another company, it has to be approved in the shareholders general meeting and also by the central government. The investment in shares of other companies in excess of 10 per cent of the subscribed capital can result into their takeovers.

Takeover vs. acquisition Sometimes, a distinction between takeover and acquisition is made. The term takeover is understood to connote hostility. When an acquisition is a 'forced' or 'unwilling' acquisition, it is called a takeover. In an unwilling acquisition, the management of "target" company would oppose a move of being taken over. When managements of acquiring and target companies mutually and willingly agree for the takeover, it is called acquisition or friendly takeover. An example of acquisition is the acquisition of controlling interest (45 per cent shares) of Universal Luggage Manufacturing Company Ltd. by Blow Plast Ltd. Similarly, Mahindra and Mahindra Ltd., a leading manufacturer of jeeps and tractors acquired a 26 per cent equity stake in Allwyn Nissan Ltd. Yet another example is the acquisition of 28 per cent equity of International Data Management (IDM) by HCL Ltd. In recent years, due to the liberalisation of financial sector as well as opening up of the economy for foreign investors, a number of hostile take-overs could be witnessed in India. Examples include takeover of Shaw Wallace, Dunlop, Mather and Platt and Hindustan Dorr Oliver by Chhabrias, Ashok Leyland by Hindujas and ICIM, Harrison Malayalam and Spencers by Goenkas. Both Hindujas and Chhabrias are non-resident Indian (NRIs).

Holding company A company can obtain the status of a **holding company** by acquiring shares of other companies. A holding company is a company that holds more than half of the nominal value of the equity capital of another company, called a **subsidiary company**, or controls the composition of its Board of Directors. Both holding and subsidiary companies retain their separate legal entities and maintain their separate books of accounts. Unlike some countries, like the USA, or the UK, India it is not legally required to consolidate accounts of holding and subsidiary companies.

11.3.3 Forms of Merger

There are three major types of mergers:

Horizontal merger This is a combination of two or more firms in similar type of production, distribution or area of business. Examples would be combining of two book publishers or two luggage manufacturing companies to gain dominant market share.

Vertical merger This is a combination of two or more firms involved in different stages of production or distribution. For example, joining of a TV manufacturing (assembling) company and a TV marketing company or the joining of a spinning company and a weaving company. Vertical merger may take the form of forward or backward merger. When a company combines with the supplier of material, it is called backward merger and when it combines with the customer, it is known as forward merger.

Conglomerate merger This is a combination of firms engaged in unrelated lines of business activity. A typical example is merging of different businesses like manufacturing of cement products,

Check Your Progress

3. Distinguish between mergers and acquisitions.
4. Which are the major types of mergers?
5. Explain the concept of horizontal, vertical and conglomerate merger?

fertilizers products, electronic products, insurance investment and advertising agencies. Voltas Ltd. is an example of a conglomerate company.

11.4 MERGERS AND ACQUISITION TRENDS IN INDIA

NOTES

Economic reforms and deregulation of the Indian economy has brought in more domestic as well as international players in Indian industries. This has caused increased competitive pressure leading to structural changes of Indian industries. M&A is a part of the restructuring strategy of Indian industries. The first M&A wave in India took place towards the end of 1990s. The data presented in the Table 11.1 reveal that substantial growth in the M&A activities in India occurred in 2000–01. The total number of M&A deals in 2000–01 was estimated at 1,177 which is 54 per cent higher than the total number of deals in the previous year. The amount involved in deals has shown variation; after falling to Rs 23,106 crore in 2002–03 the amount increased to Rs 35,980 crore in 2003–04.

Table 11.1: M&A in India

	Deals	
Year	***Number***	***Amount (Rs in crore)***
1998–99	292	16,071
1999–00	765	36,963
2000–01	1,177	32,130
2001–02	1,045	34,322
2002–03	838	23,106
2003–04	834	35,980

The total number of mergers in 2003–04 was 284, down from 381 mergers in the previous period. From data in Table 11.2, it appears that mergers account for around one-third of total M&A deals in India. It implies that takeovers or acquisitions are the dominant feature of M&A activity in India, similar to the trend in most of the developed countries. Along with the rise in M&A, there has also an increase in the number of open offers, *albeit* at a lower pace. The number of open offers rose to 109 in 2002–03 from 58 in 1998–99. In 2003–04, 72 open offers involved Rs 1,122 crore – much less than as compared to the previous year.

Table 11.2: Share of Mergers in M&A in India

Year	***M&A***	***Merger***	***%***
1998–99	292	80	27.4%
1999–00	765	193	25.2%
2000–01	1177	327	27.8%
2001–02	1045	323	30.9%
2002–03	838	381	45.5%
2003–04	834	284	34.1%

11.5 MOTIVES AND BENEFITS OF MERGERS AND ACQUISITIONS

Check Your Progress

6. Why has M&A activity increased in India in recent years?

Why do mergers take place? It is believed that mergers and acquisitions are strategic decisions leading to the maximisation of a company's growth by enhancing its production and marketing operations. They have become popular in the recent times because of the enhanced competition,

NOTES

breaking of trade barriers, free flow of capital across countries and globalisation of business as a number of economies are being deregulated and integrated with other economies. A number of reasons are attributed for the occurrence of mergers and acquisitions. For example, it is suggested that mergers and acquisition are intended to:[4]

- Limit competition
- Utilise under-utilised market power
- Overcome the Problem of slow growth and profitability in one's own industry
- Achieve diversification
- Gain economies of scale and increase income with proportionately less investment
- Establish a transnational bridgehead without excessive start-up costs to gain access to a foreign market
- Utilise under-utilised resources—human and physical and managerial skills
- Displace existing management
- Circumvent government regulations
- Reap speculative gains attendant upon new security issue or change in P/E ratio
- Create an image of aggressiveness and strategic opportunism, empire building and to amass vast economic powers of the company.

Are there any real benefits of merger? A number of benefits of mergers are claimed.[5] All of them are not real benefits. Based on the empirical evidence and the experiences of certain companies, the most common motives and advantages of mergers and acquisitions are explained below:

- Maintaining or accelerating a company's growth, particularly when the internal growth is constrained due to paucity of resources;
- Enhancing profitability, through cost reduction resulting from economies of scale, operating efficiency and synergy;
- Diversifying the risk of the company, particularly when it acquires those businesses whose income streams are not correlated;
- Reducing tax liability because of the provision of setting-off accumulated losses and unabsorbed depreciation of one company against the profits of another;
- Limiting the severity of competition by increasing the company's market power.

11.5.1 Accelerated Growth

Growth is essential for sustaining the viability, dynamism and value-enhancing capability of a company. A growth-oriented company is not only able to attract the most talented executives but it would also be able to retain them. Growing operations provide challenges and excitement to the executives as well as opportunities for their job enrichment and rapid career development. This helps to increase managerial efficiency. Other things remaining the same, growth leads to higher profits and increase in the shareholders' value. A company can achieve its growth objective by:

- Expanding its existing markets
- Entering in new markets.

A company may expand and/or diversify its markets internally or externally. If the company cannot grow internally due to lack of physical and managerial resources, it can grow externally by combining its operations with other companies through mergers and acquisitions. Mergers and acquisitions may help to accelerate the pace of a company's growth in a convenient and inexpensive manner.

Internal growth requires that the company should develop its operating facilities—manufacturing, research, marketing etc. Internal development of facilities for growth also requires time. Thus, lack

4. Ansoff H.L. *et. al., Acquisitive Behaviour of U.S. Manufacturing Firms* 1946–65, Vanderbilt University Press, 1971.
5. For example, see Van Horne, J.C., *Financial Management and Policy*, Prentice-Hall of India, 1985, pp. 610–13; and Brealey, R.A. and Myers, S.C., *Principles of Corporate Finance*, McGraw Hill, 1991, pp. 820–28.

or inadequacy of resources and time needed for internal development constrains a company's pace of growth. The company can acquire production facilities as well as other resources from outside through mergers and acquisitions. Specially, for entering in new products/markets, the company may lack technical skills and may require special marketing skills and/or a wide distribution network to access different segments of markets. The company can acquire existing company or companies with requisite infrastructure and skills and grow quickly.

Mergers and acquisitions, however, involve cost. External growth could be expensive if the company pays an excessive price for merger. Benefits should exceed the cost of acquisition for realising a growth which adds value to shareholders. In practice, it has been found that the management of a number of acquiring companies paid an excessive price for acquisition to satisfy their urge for high growth and large size of their companies. It is necessary that price may be carefully determined and negotiated so that merger enhances the value of shareholders.

11.5.2 Enhanced Profitability

The combination of two or more companies may result in more than the average profitability due to cost reduction and efficient utilisation of resources. This may happen because of the following reasons:

- Economies of scale
- Operating economies
- Synergy.

Economies of scale Economies of scale arise when increase in the volume of production leads to a reduction in the cost of production per unit. Merger may help to expand volume of production without a corresponding increase in fixed costs. Thus, fixed costs are distributed over a large volume of production causing the unit cost of production to decline. Economies of scale may also arise from other indivisibilities such as production facilities, management functions and management resources and systems. This happens because a given function, facility or resource is utilised for a larger scale of operation. For example, a given mix of plant and machinery can produce scale economies when its capacity utilisation is increased. Economies will be maximised when it is optimally utilised. Similarly, economies in the use of the marketing function can be achieved by covering wider markets and customers using a given sales force and promotion and advertising efforts. Economies of scale may also be obtained from the optimum utilisation of management resource and systems of planning, budgeting, reporting and control. A company establishes management systems by employing enough qualified professionals irrespective of its size. A combined firm with a large size can make the optimum use of the management resource and systems resulting in economies of scale.

Operating economies In addition to economies of scale, a combination of two or more firms may result into cost reduction due to operating economies. A combined firm may avoid or reduce overlapping functions and facilities. It can consolidate its management functions such as manufacturing, marketing, R&D and reduce operating costs. For example, a combined firm may eliminate duplicate channels of distribution, or create a centralised training centre, or introduce an integrated planning and control system.

In a vertical merger, a firm may either combine with its suppliers of input (**backward integration**) and/or with its customers (**forward integration**). Such merger facilitates better coordination and administration of the different stages of business operations—purchasing, manufacturing, and marketing—eliminates the need for bargaining (with suppliers and/or customers), and minimises uncertainty of supply of inputs and demand for product and saves costs of communication.

An example of a merger resulting in operating economies is the merger of Sundaram Clayton Ltd (SCL) with TVS-Suzuki Ltd (TSL). By this merger, TSL became the second largest producer of two-wheelers after Bajaj. The main motivation for the takeover was TSL's need to tide over its different market situation through increased volume of production. It needed a large manufacturing base to reduce its production costs. Large amount of funds would have been required for creating additional production capacity. SCL also needed to upgrade its technology and increase its production. SCL's and TSL's plants were closely located which added to their advantages. The

NOTES

combined company has also been enabled to share the common R&D facilities. Yet another example of a horizontal merger motivated by the desire for rationalisation of operations is the takeover of Universal Luggage by Blow Plast. The intended objectives were elimination of fierce price war and reduction of marketing staff.

Synergy Synergy implies a situation where the combined firm is more valuable than the sum of the individual combining firms. It is defined as 'two plus two equal to five' (2 + 2 = 5) phenomenon. Synergy refers to benefits other than those related to economies of scale. Operating economies are one form of synergy benefits.[6] But apart from operating economies, synergy may also arise from enhanced managerial capabilities, creativity, innovativeness, R&D and market coverage capacity due to the complementarities of resources and skills and a widened horizon of opportunities.

11.5.3 Diversification of Risk

Diversification implies growth through the combination of firms in unrelated businesses. Such mergers are called conglomerate mergers. It is difficult to justify conglomerate merger on the ground of economies, as it does not help to strengthen horizontal or vertical linkages. It is argued that it can result into reduction of total risk through substantial reduction of cyclicality of operations. Total risk will be reduced if the operations of the combining firms are negatively correlated.

In practice, investors can reduce **non-systematic risk** (the company related risk) by diversifying their investment in shares of a large number of companies. **Systematic risk** (the market related risk) is not diversifiable. Therefore, investors do not pay any premium for diversifying total risk via reduction in non-systematic risk that they can do on their own, cheaply and quickly. For example, an investor who holds one per cent of shares of Company *X* and one per cent of shares of Company *Y* could achieve the same share of earnings and assets if Companies *X* and *Y* merged and he held one per cent of shares of the merged company. The risk from his point of view has been diversified by his acquiring shares of the two companies. Of course, the merger of two companies may reduce the variability of earnings, but it would not necessarily reduce the variability of earnings *vis-à-vis* the market-related variables. What advantage can result from conglomerate mergers for shareholders who can diversify their portfolios to reduce non-systematic risk? The reduction of total risk, however, is advantageous from the combined company's point of view, since the combination of management and other systems strengthen the capacity of the combined firm to withstand the severity of the unforeseen economic factors that could otherwise endanger the survival of individual companies. Conglomerate mergers can also prove to be beneficial in the case of shareholders of unquoted companies since they do not have opportunity for trading in their company's shares.

An example of diversification through mergers to reduce total risk and improve profitability is that of RPG Enterprises (Goenka Group). The group started its takeover activity in 1979. It comprises a large number of companies, most of which have been takeover. The strategy has been to look out for any foreign disinvestment, or any cases of sick companies, which could prove right targets at low takeover prices. In 1988, RPG took over ICIM and Harrisons Malayalam Limited. In the case of ICIM, the parent company, ICL, continued to hold 40 per cent of the equity stake with the Goenkas acquiring 10 per cent of the equity by private placement of shares. For the Goenkas, this has provided an easy access to the electronics industry.

11.5.4 Reduction in Tax Liability

In a number of countries, a company is allowed to carry forward its accumulated loss to set-off against its future earnings for calculating its tax liability. A loss-making or sick company may not be in a position to earn sufficient profits in future to take advantage of the carry forward provision. If it combines with a profitable company, the combined company can utilise the carry forward loss and save taxes. In India, a profitable company is allowed to merge with a sick company to set-off against its profits the accumulated loss and unutilised depreciation of that company. A number of companies in India have merged to take advantage of this provision.

6. Van Horne, *op. cit.*, p. 611.

An example of a merger to reduce tax liability is the absorption of Ahmedabad Cotton Mills Limited (ACML) by Arbind Mills in 1979. ACML was closed in August 1977 on account of labour Problem. At the time of merger in April 1979, ACML had an accumulated loss of Rs 3.34 crore. Arbind Mills saved about Rs 2 crore in tax liability for the next two years after the merger because it could set-off ACML's accumulated loss against its profits. Yet another example of a merger induced by tax saving is the takeover of Sidhpur Mills by Reliance in 1979. The carry-forward losses and unabsorbed depreciation of Sidhpur amounted to Rs 2.47 crores. In addition to tax savings, the merger provided Reliance with an opportunity for vertical integration (Sidhpur would supply grey cloth to Reliance) and capacity expansion (Sidhpur had 490 looms and 50,000 spindles and 40 acres of land).

When two companies merge through an exchange of shares, the shareholders of selling company can save tax. The profit arising from the exchange of shares are not taxable until the shares are actually sold. When the shares are sold, they are subject to capital gains tax rate which is much lower than the ordinary income tax rate. For example, in India capital gains tax rate is 20 per cent while the personal tax rate is 30 per cent.

A strong urge to reduce tax liability, particularly when the marginal tax rate is high (as has been the case in India) is a strong motivation for the combination of companies. For example, the high tax rate was the main reason for the post-war merger activity in the USA. Also, tax benefits are responsible for one-third of mergers in the USA.[7]

11.5.5 Financial Benefits

There are many ways in which a merger can result into financial synergy and benefits. A merger may help in:

- Eliminating the financial constraint
- Deploying surplus cash
- Enhancing debt capacity
- Lowering the financing costs.

Financing constraint A company may be constrained to grow through internal development due to shortage of funds. The company can grow externally by acquiring another company by the exchange of shares and thus, release the financing constraint.

Surplus cash A cash-rich company may face a different situation. It may not have enough internal opportunities to invest its surplus cash. It may either distribute its surplus cash to its shareholders or use it to acquire some other company. The shareholders may not really benefit much if surplus cash is returned to them since they would have to pay tax at ordinary income tax rate. Their wealth may increase through an increase in the market value of their shares if surplus cash is used to acquire another company. If they sell their shares, they would pay tax at a lower, capital gains tax rate. The company would also be enabled to keep surplus funds and grow through acquisition.

Debt capacity A merger of two companies, with fluctuating, but negatively correlated, cash flows, can bring stability of cash flows of the combined company. The stability of cash flows reduces the risk of insolvency and enhances the capacity of the new entity to service a larger amount of debt. The increased borrowing allows a higher interest tax shield which adds to the shareholders wealth.

Financing cost Does the enhanced debt capacity of the merged firm reduce its cost of capital? Since the probability of insolvency is reduced due to financial stability and increased protection to lenders, the merged firm should be able to borrow at a lower rate of interest. This advantage may, however, be taken off partially or completely by increase in the shareholders' risk on account of providing better protection to lenders.

Another aspect of the financing costs is issue costs. A merged firm is able to realize economies of scale in flotation and transaction costs related to an issue of capital. Issue costs are saved when the merged firm makes a larger security issue.

7. Weston, J.F. and Brigham, E.F., *Essentials of Managerial Finance*, Dryden Press, 1977, p. 515.

NOTES

EXHIBIT 11.1: THE TOMCO–LEVER MEGA MERGER

- On the afternoon of 9 March, 1993 Tata Oils Mills Company Limited (Tomco) informed the Bombay Stock Exchange about its intention to merge with the Hindustan Lever Ltd (Levers). The board of directors of the two companies approved the merger on 19 March, 1993. Tomco is a Rs 4,460 million turnover (1992) company and Lever a Rs 20,000 million.
- Lever would control one-third of three million-tonne soaps and detergents markets by this merger. Some competitors of Levers think that it will eliminate competition. The management of Lever, however, feels that the merger would result into a strategic fit in many areas such as brand positioning, manufacturing locations, geographical reach and distribution network. Tomco has four manufacturing plants and a large distributor network covering 2,400 stockists and nine million outlets. It is quite strong in South.
- Merger would have many benefits for Tomco which is reported to have incurred a loss of Rs 66 millions the first six months of 1992–93. It was Lever's nearest rival, but lagged much behind in the eighties. A number of attempts by management to revive Tomco through diversification did not succeed.
- The acquisition of Tomco by Levers to gain the market leadership and dominance is seen strategically important in view of the intensifying competition and the strategic alliance of competition such as the one between Godrej Soaps and the American multinational Proctor and Gamble. A number of people think that it is a land-mark merger. But to obtain the full advantages of the merger a number of issues will have to be resolved:
  - rationalisation of the duplicate brands
  - effective deployment and productivity improvement of Tomco's 5,500 employees
  - bridging the gap between two cultures.

Source: Karmali, "Tomco-Levers: A Short-term Marriage", *Business India*, March 15–28, 1993, p. 77.

11.5.6 Increased Market Power

A merger can increase the market share of the merged firm. As discussed earlier, the increased concentration or market share improves the profitability of the firm due to economies of scale. The bargaining power of the firm *vis-à-vis* labour, suppliers and buyers is also enhanced. The merged firm can also exploit technological breakthroughs against obsolescence and price wars. Thus, by limiting competition, the merged firm can earn super-normal profit and strategically employ the surplus funds to further consolidate its position and improve its market power.

We can once again refer to the acquisition of Universal Luggage by Blow Plast as an example of limiting competition to increase market power. Before the merger, the two companies were competing fiercely with each other leading to a severe price war and increased marketing costs. As a result of the merger, Blow Plast has obtained a strong hold on the market and now operates under near monopoly situation. Yet another example is the acquisition of Tomco by Hindustan Lever. Hindustan Lever at the time of merger was expected to control one-third of three million-tonne soaps and detergents markets and thus, substantially reduce the threat of competition (see Exhibit 11.1).

Merger or acquisition is not the only route to obtain market power. A firm can increase its market share through internal growth or joint ventures or strategic alliances. Also, it is not necessary that the increased market power of the merged firm will lead to efficiency and optimum allocation of resources. Market power means undue concentration that could limit the choice of buyers as well as exploit suppliers and labour.

Check Your Progress

7. Under what conditions will a merger of two companies result in improving the profitability of the merged entity?
8. List some of the financial benefits of a merger.
9. What are the underlying financial benefits in case of merger?

Illustration 11.1: Sharing Economic Advantage

Firm *P* has a total market value of Rs 18 crore (12 lakh shares of Rs 150 market value per share). Firm *Q* has a total market value of Rs 3 crore (5 lakh of Rs 60 market value per share). Firm *P* is considering the acquisition of Firm *Q*. The value of P after merger (that is, the combined value of the merged firms) is expected to be Rs 25 crore due to the operating efficiencies. Firm *P* is required to pay Rs 4.5 crore to acquire Firm *Q*. What is the net economic advantage to Firm *P* if it acquires Firm *Q*?

The net economic advantage is the difference between the economic advantage and the cost of merger to *P*:

NEA = [25 – (18 + 3)] – (4.5 – 3) = 4 – 1.5 = Rs 2.5 crore

The economic advantage of Rs 4 crore is divided between the acquiring firm Rs 2.5 crore and the target firm, Rs 1.5 crore.

NOTES

11.6 VALUE CREATION THROUGH MERGERS AND ACQUISITIONS

A merger will make economic sense to the acquiring firm if its shareholders benefit. Merger will create an economic advantage (EA) when the combined present value of the merged firms is greater than the sum of their individual present values as separate entities. For example, if firm *P* and firm *Q* merge, and they are separately worth V_P and V_Q, respectively, and worth V_{PQ} in combination, then the economic advantage will occur if:

$$V_{PQ} > (V_P + V_Q)$$

The economic advantage is equal to:

$$EA = V_{PQ} - (V_P + V_Q)$$

Acquisition or merger involves costs. Suppose that firm *P* acquires firm *Q*. After acquisition *P* will gain the present value of *Q*, i.e., V_Q, but it will also have to pay a price (say in cash) to *Q*. Thus, the cost of merging to *P* is: Cash paid – V_Q. For *P*, the net economic advantage of merger (NEA) is positive if the economic advantage exceeds the cost of merging. Thus

$$\begin{matrix}\text{Net economic} \\ \text{advantage}\end{matrix} = \begin{matrix}\text{Economic} \\ \text{advantage}\end{matrix} - \begin{matrix}\text{Cost of} \\ \text{merger}\end{matrix}$$

$$\text{NEA} = [V_{PQ} - (V_P + V_Q)] - (\text{cash paid} - V_Q)$$

The economic advantage, i.e., $[VP_Q - (V_P + V_Q)]$, represents the benefits resulting from operating efficiencies and synergy when two firms merge. If the acquiring firm pays cash equal to the value of the acquired firm, i.e., cash paid – $V_Q = 0$, then the entire advantage of merger will accrue to the shareholders of the acquiring firm. In practice, the acquiring and the acquired firm may share the economic advantage between themselves.

The acquiring firm can issue shares to the target firm instead of paying cash. The effect will be the same if the shares are exchanged in the ratio of cash-to-be-paid to combined value of the merged firms. In Illustration 11.1, Firm *P* may issue 4.5/25 = 0.18 or 18 per cent shares to *Q*'s shareholders in the combined firm. Then the total number of shares (*X*) in the combined firm will be as follows:

$$X = 12 + 0.18X$$

$$X - 0.18X = 12$$

$$X = 12 / 0.82 = 14.63 \text{ lakh shares}$$

The new share price will be: 25/0.1463 = Rs 170.9. Firm *Q* will get 2.63 lakh shares of Rs 170.9 each. Thus, the cost of acquisition to Firm *P* remains the same: (2.63 lakh × Rs 170.9) – Rs 3 crore = Rs 1.5 crore.

In practice, the number of shares to be exchanged may be based on the current market value of the acquiring firm. Thus, in Illustration 11.1, Firm *Q* may require 300,000 shares (i.e., Rs 4.5 crore/ Rs 150) of the acquiring Firm *P*. Now Firm *P* after merger will have 15 lakh shares of total value of Rs 25 crore. The new share price will be: Rs 25/0.15 = Rs 166.67. The worth of shares given to the shareholders of Firm *Q* will be Rs 5 crore (i.e., Rs 166.67 × 3 lakh). The cost of merger to Firm *P* is Rs 2 crore (i.e., the value of share exchanged, Rs 5 crore less the value of the acquired firm, Rs 3 crore). Thus, the effective cost of merger may be more when issuing shares rather than paying cash finances the merger.

Check Your Progress

10. When does a merger make economic sense to shareholders?

11.7 VALUATION UNDER MERGERS AND ACQUISITIONS: DCF APPROACH

NOTES

In a merger or acquisition, the acquiring firm is buying the business of the target firm, rather than a specific asset. Thus, merger is a special type of capital budgeting decision. What is the value of the target firm to the acquiring firm? This value should include the effect of operating efficiencies and synergy. The acquiring firm should appraise merger as a capital budgeting decision, following the discounted cash flow (DCF) approach. The acquiring firm incurs a cost (in buying the business of the target firm) in the expectation of a stream of benefits (in the form of cash flows) in the future. The merger will be advantageous to the acquiring company if the present value of the target merger is greater than the cost of acquisition.

Mergers and acquisitions involve complex set of managerial problems than the purchase of an asset. Nevertheless, DCF approach is an important tool in analyzing mergers and acquisitions. In order to apply DCF technique, the following information is required:

- estimation of free cash flows over the horizon period
- estimation of the value of cash flows beyond the horizon period
- discount rate

Earnings are the basis for estimating free cash flows. As discussed in previous chapters, free cash flows include adjustments for depreciation, capital expenditure and working capital. The appropriate discount rate depends on the risk of the expected cash flows of the target company. Given the target firm's target capital structure, its WACC is used as the discount rate. The following steps are involved in the valuation of a merger (or acquisition):[8]

- Identify growth and profitability assumptions
- Estimate cash flows and terminal value
- Estimate the cost of capital
- Compute present value of cash flows
- Decide if the acquisition is attractive on the basis of present value
- Decide if the acquisition should be financed through cash or exchange of shares
- Evaluate the impact of the merger on EPS and price-earnings ratio.

Consider the case of SFC and Excel in Illustration 11.2 for an approach for the financial evaluation of a merger.

Illustration 11.2: DCF Valuation of an Acquisition

The management of Sangam Fertilisers Company (SFC) is concerned about the fluctuating sales and earnings. The variability of the company's earnings has caused its P/E ratio at about 22 to be much lower than the industry average of about 45. Tables 11.1 and 11.2 contain SFC's most recent summarised profit and loss account and balance sheet. Currently, SFC's share is selling for Rs 57.60 in the market. To boost its sales and bring stability to its earnings, SFC's management has identified Excel Chemicals Company as a possible target for acquisition. Excel is known for its quality of products and its nation-wide markets. The company has not been performing well in the recent past due to poor management (see Tables 11.3 and 11.4 for Excel's summarised financial performance). Its sales have grown at 4 per cent per year during the 2000–04 against the industry growth rate of 8 per cent per year. The current price of Excel's share is Rs 24.90.

The management of SFC is confident that after acquisition, they could turn around Excel. They could increase Excel's growth rate to 8 per cent within two-three years and reduce cost of goods sold to 66 per cent of sales and selling and administrative expenses to 15 per cent. SFC anticipates that to support the growth in Excel's sales, capital expenditure (CAPEX) equal to 5 per cent of sales may be needed each year. The capital will maintain its capital structure in the market value terms at the current level. The market borrowing rate is 15 per cent. The corporate tax rate is 35 per cent.

What is the value of Excel if SFC acquires it? At what price should SFC pay for each share of Excel?

8. Rappapport, A., "Strategic Analysis for More Profitable Acquisitions, *Harvard Business Review*, July-August 1979, pp. 99–110.

Table 11.3: SFC: Summarised Profit and Loss Account during the Year Ending on 31 March, 2004

	(Rs in crore)
Profit and Loss Items	
Net Sales	8,205
Cost of goods sold	5,975
Depreciation	143
Selling & administrative	1,020
Total expenses	7,138
PBIT	1,067
Interest	284
PBT	783
Tax	380
PAT	403
Per Share Data	
EPS (Rs)	2.56
DPS (Rs)	1.80
Book value (Rs)	27.49
Market Value (Rs):	
High	75.05
Low	38.00
Average	56.53
P/E ratio:	
High	29.32
Low	14.84
Average	22.08

Table 11.4: SFC: Summarised Balance Sheet as on 31 March, 2004

		(Rs in crore)
Source of Funds		
Shareholders' Funds		
Paid up capital (157.50 crore shares @ Rs 10)	1,575	
Reserves and Surplus	2,755	4,330
Borrowed Funds:		
Secured	1,203	
Unsecured	967	2,170
Capital Employed		6,500
Uses of Funds		
Gross Block	6,231	
Less: Depreciation	1,626	
Net Block	4,605	
Investment	29	4,634
Current Assets	3,726	
Less: Current Liabilities	1,860	
Net Current Assets		1,866
Net Assets		6,500

We can use the DCF approach to determine the value of Excel to SFC. The economic gain from the merger of Excel with SFC would basically come from the higher sales growth and improved profitability due to reduction in the cost of goods sold and the selling and administrative expenses. It is expected that if SFC acquires Excel, it would be able to improve Excel's overall management, use its strong distribution system for increasing sales, and consolidate its operations, systems and functions to facilitate operating economies and cost reduction.

NOTES

Table 11.5: Excel Chemicals Company: Summarised Profit and Loss Statement and Per Share Data

				(Rs in crore)	
	2000	***2001***	***2002***	***2003***	***2004***
Profit and Loss Items					
Net Sales	1,442	1,477	1,580	1,642	1,695
Cost of goods sold	995	1,042	1,125	1,165	1,195
Depreciation	37	40	45	45	40
Selling and admin. expenses	260	275	280	292	302
Total expenses	1,292	1,357	1,450	1,502	1,537
PBIT	150	120	130	140	158
Interest	19	15	23	25	30
PBT	131	105	107	115	128
Tax	45	34	35	40	45
PAT	86	71	72	75	83
EPS (Rs)	3.44	2.84	2.88	3.00	3.32
DPS (Rs)	1.70	1.50	1.50	1.70	2.20
Book value (Rs)	23.76	25.00	26.28	27.68	29.20
Market Value (Rs): High	30.84	44.04	42.25	35.48	28.16
Low	22.12	25.80	24.38	16.28	13.14
Average	26.48	34.92	33.32	25.88	20.65
P/E ratio: High	8.97	15.51	14.67	11.83	8.48
Low	6.43	9.08	8.47	5.43	3.96
Average	7.70	12.30	11.57	8.27	6.22

Table 11.6: Excel Chemicals Company: Summarized Balance Sheet as on 31 March, 2004

Balance Sheet Items		***(Rs in crore)***
Source of Funds		
Shareholders' Funds		
Paid up capital (25,000 shares of Rs 10 each)	250	
Reserves and Surplus	425	675
Borrowed Funds:		
Secured	200	
Unsecured	95	295
Capital Employed		970
Uses of Funds		
Gross Block	657	
Less: Depreciation	285	
Net Block		372
Investment		23
Current Assets	753	
Less: Current Liabilities	178	
Net Current Assets		575
Net Assets	970	

11.7.1 Estimating Free Cash Flows

Revenues and expenses The first step in the estimation of cash flows is the projection of sales. Excel in the past has grown at an average annual rate of 4 per cent. After acquisition, sales are expected to grow at 8 per cent per year. We assume that SFC would need a few years to achieve this growth rate. Thus sales may be assumed to grow at 5 per cent in 2005, 6 per cent in 2006, 7 per cent in 2007 and thereafter, at 8 per cent per annum. The second step is to estimate expenses. Due to operating efficiency and consolidation of operations, costs are expected to decline. Excel's cost of goods sold has averaged around 70–71 per cent of sales and is now anticipated to be brought down to 66 per cent of sales. We may assume that SFC would take about two-three years to reduce the cost of goods sold. Selling and administrative expenses can also be estimated in the similar way.

Capex and depreciation Depreciation can be estimated keeping in mind the anticipated capital expenditure in each year (*viz.*, 5 per cent of sales) and average annual depreciation rate (*viz.*, about 11 per cent for Excel during the past five years). We have assumed a diminishing balance method for depreciation.[9] Thus, depreciation for 2005 and 2006 would be as follows:

$$DEP_{05} = 0.11(372 + CAPEX_{04}) = 0.11(372 + 0.05 \times 1780)$$
$$= 0.11(372 + 89) = 0.11(461) = 51$$
$$DEP_{06} = 0.11(461 - 50 + 0.05 \times 1887) = 0.11(411 + 94) = 56$$

CAPEX and depreciation for other years can be similarly calculated as shown in Table 11.5.

Working* capital *changes In the calculation of the cash flows, we should also account for increase in net working capital (NWC) due to expansion of sales. Excel's net working capital to

Table 11.7: Excel Chemicals Company

Estimation of Cash Flows (***Rs in crore***)

	Actual	***Estimates***									
Year	***2004***	***2005***	***2006***	***2007***	***2008***	***2009***	***2010***	***2011***	***2012***	***2013***	***2014***
Net sales	1695	1780	1887	2019	2180	2354	2543	2746	2966	3203	3460
Cost of goods sold	1195	1246	1302	1360	1439	1554	1678	1813	1958	2114	2283
S&A expenses	302	302	302	302	327	353	381	412	445	480	519
Depreciation	40	51	56	61	66	72	78	84	91	99	107
Total expenses	1537	1599	1660	1723	1832	1979	2137	2309	2494	2693	2909
PBIT	158	181	227	296	348	376	405	438	472	510	550
Tax @ 35%	55	63	79	104	122	132	142	153	165	178	193
NOPAT	103	118	148	192	226	244	264	284	307	331	358
Plus: Depreciation	40	51	56	61	66	72	78	84	91	99	107
Funds from operations	143	168	203	253	292	316	341	369	398	430	465
Less: Increase NWC*		30	36	45	55	59	64	69	75	81	87
Cash from operations		138	167	208	237	257	277	299	324	350	378
Less: Capex		89	94	101	109	118	127	137	148	160	173
Free cash flows		49	72	107	128	139	150	162	175	189	205
Add: Salvage value											2369
NCF		49	72	107	128	139	150	162	175	189	2574
PVF at 13%		.885	.783	.693	.613	.543	.480	.425	.376	.333	.295
Present value	**1355**	43	56	74	78	75	72	69	66	63	759
* *NWC* (*34% of sales*)	575	605	641	686	741	801	865	934	1008	1089	1176

9. It is assumed that 11 per cent represent the average of the WDV depreciation rates for the various blocks of assets, as prescribed under the Indian tax rules.

NOTES

sales ratio in 2004 is 34 per cent. If assume that working capital is managed as in the past, we can expect NWC to sales ratio to remain as 34 per cent. Note that since we shall be calculating the value of Excel (representing the value of both shareholders and lenders), using the weighed cost of capital as the discount rate, interest charges would not be subtracted in calculating free flows. Excel has been paying an average tax of 34 per cent. This might be due to tax incentives available to the company. The company will pay tax at current marginal tax rate of 35 per cent. Table 11.7 provides the estimation of net cash flows.

11.7.2 Estimating the Cost of Capital

Since we are determining Excel's value, the discount rate should be Excel's average cost of capital. In the year 2004, the outstanding debt of the company is Rs 295 crore and interest paid is Rs 30 crore. Thus, the interest rate works out to 10.2 per cent. The current rate of borrowing is 15 per cent. On the after-tax basis, the cost of debt would be: 0.15 (1 – 0.35) = 0.975 or 11.75 per cent.

We can calculate the company's cost of equity using the dividend–growth model. Excel's current share price is Rs 24.90, and it paid a dividend of Rs 2.20 in 2004. Thus, its dividend yield is: 2.20/ 24.90 = 0.088 or 8.8 per cent. The company has been paying about 55 per cent of its earnings as dividend and retaining 45 per cent. The average return (over last five years) on equity has been about 12 per cent. Thus, the company's growth rate is: 0.45 × 0.12 = 0.054 or 5.4 per cent. Excel's cost of equity is: 0.088 + 0.054 = 0.142 or 14.20 per cent. The company has outstanding debt of Rs 295 crore and the market value of equity is Rs 622.50 crore (25 crore × Rs 24.90). Thus debt ratio is: 295/622.50 = 0.32 or 32 per cent. Given its capital structure in the year 2004, its weighted average cost of capital is about 13 per cent (see Table 11.8).

Table 11.8: Excel's Weighted Average Cost of Capital

	Amount (Rs in crore)	***Weighted***	***Cost***	***Weight Cost***
Equity	622.50	0.68	0.1420	0.097
Debt	295.00	0.32	0.0975	0.031
	917.50	1.000		0.128

11.7.3 Terminal Value

Terminal value is the value of cash flows after the horizon period. It is difficult to estimate the terminal value of the firm. One approach is to capitalise the net operating profit after tax (NOPAT) at the end of the *horizon period* at WACC. NOPAT at the end of horizon period (tenth year) is Rs 358 crore and the discount rate is 13 per cent. Thus, the salvage value is:

$$\text{Salvage value} = \frac{\text{NOPAT}}{\text{Cost of capital}} = \frac{358}{0.13} = \text{Rs}\,2{,}754$$

The conceptually more appropriate approach is to consider net cash flows (not earnings) for calculating the salvage value. We may take a conservative approach and assume that after horizon period, cash flows will not grow. Thus the terminal value will be as follows:

$$\text{Salvage value} = \frac{\text{NCF}}{\text{Cost of capital}} = \frac{205}{0.13} = \text{Rs}\,1{,}577$$

The alternative assumption is that net cash flows would grow at a constant normal rate of 4 per cent. Then, the salvage value can be calculated using a method similar to the dividend-growth model as follows:

$$SV_n = \frac{\text{NCF}_n(1+g)}{k-g} = \frac{205(1.04)}{0.13-0.04} = \frac{213.20}{0.09} \text{ Rs } 2{,}369$$

We have used this value, (Rs 2,369 crore) in our calculations in Table 11.7.

11.7.4 Value of Excel's Shares

We can discount the net cash flows in Table 11.5 to calculate Excel's value. It is Rs 1,300 crore. Since EXCEL has Rs 295 crore outstanding debt in the year 2004, the value of its shares is:

	(*Rs in crore*)
Excel's Value	1355
Less: Debt	295
Value of Excel's Shares	1060

$$\text{Value per share} = \frac{1060}{25} = \text{Rs } 42.40$$

The maximum price per share that SFC may be prepared to pay for Excel's share is Rs 42.40. The current market price of the share is Rs 24.90. Thus, SFC may have to pay a premium of about 70 per cent over the current market price. How should SFC finance acquisition of Excel? Should it exchange shares or pay in cash?

11.8 FINANCING A MERGER

Cash or exchange of shares or a combination of cash, shares and debt can finance a merger or an acquisition. The means of financing may change the debt-equity mix of the combined or the acquiring firm after the merger. When a large merger takes place, the desired capital structure is difficult to be maintained, and it makes the calculation of the cost of capital a formidable task. Thus, the choice of the means of financing a merger may be influenced by its impact on the acquiring firm's capital structure. The other important factors are the financial condition and liquidity position of the acquiring firm, the capital market conditions, the availability of long-term debt etc.

11.8.1 Cash Offer

A cash offer is a straightforward means of financing a merger. It does not cause any dilution in the earnings per share and the ownership of the existing shareholders of the acquiring company. It is also unlikely to cause wide fluctuations in the share prices of the merging companies. The shareholders of the target company get cash for selling their shares to the acquiring company. This may involve tax liability for them.

Let us assume that SFC decided to offer a price of Rs 42.40 per share to acquire Excel's shares. If SFC wants to pay cash for the shares, it would need Rs 1,060 crore in cash. It can borrow funds as well as use its tradable (temporary) investment and surplus cash for acquiring Excel. SFC's current debt is Rs 2,170 crore, which is 50 per cent of its book value equity. After merger, the combined firm's debt would be Rs 2,465 crore (Rs 2,170 crore of SFC and Rs 295 crore of Excel). The debt capacity of the combined firm would depend on its target debt-equity ratio. Assuming that it is 1:1, then it can have a total debt of Rs 4,330 crore (i.e., equal to the combined firm's equity, which is, pre-merger equity of SFC). Thus, unutilised debt capacity is Rs 1,865, crore (i.e., Rs 4,330 crore minus the combined debt of SFC and Excel, Rs 2,465 crore). Further, both companies have marketable investments of Rs 52 crore, which may also be available for acquisition. Given SFC has unutilised debt capacity (Rs 1,865 crore), it can borrow Rs 1,060 crore to acquire Excel.

11.8.2 Share Exchange

A share exchange offer will result into the sharing of ownership of the acquiring company between its existing shareholders and new shareholders (that is, shareholders of the acquired company). The earnings and benefits would also be shared between these two groups of shareholders. The precise extent of net benefits that accrue to each group depends on the **exchange ratio** in terms of the market prices of the shares of the acquiring and the acquired companies. In an exchange of shares, the receiving shareholders would not pay any ordinary

NOTES

Check Your Progress

11. What are the key factors which will help valuation of an M&A proposal under the DCF approach?
12. What are the relevant cash flows which have to be estimated while deciding on a merger proposal?

NOTES

income tax immediately. They would pay capital gains tax when they sell their shares after holding them for the required period.

SFC, instead of paying cash, could acquire Excel through the exchange of shares. For simplicity, let us assume that SFC's share price is fairly valued in the market. If the company feels that its shares are either under-valued or over-valued in the market, it can follow a similar procedure as in the case of Excel to calculate the value of its shares. SFC's current price per share is Rs 57.80 and it has 157.50 crore outstanding shares. At its current share price, the company must exchange: Rs 1,060 crore/Rs 57.80 = 18.34 crore shares to pay Rs 1,060 crore to Excel. After acquisition, SFC would have 175.84 crore (157.50 crore + 18.34 crore) shares outstanding. Thus, in the combined firm, Excel's shareholders would hold about 10.4 per cent of shares (i.e., 18.34/175.84). Excel's shares are valued at Rs 1,060 crore and the value of SFC's shares at the current market price is Rs 9,104 crore (157.5 crore × Rs 57.80). Thus the post-merger value of the combined firm is Rs 10,164 crore, and per share value is: Rs 10,164/175.84 = Rs 57.80. Thus there is no loss, no gain to SFC's shareholders.

Table 11.8: Impact of SFC and Excel Merger on EPS

SFC's (the acquiring firm) PAT before merger, PAT_a (Rs in crore)	403.00
Excel's (the acquired firm) PAT if merged with SFC, PAT_b (Rs in crore)	83.00
PAT of the combined firms after merger, $PAT_a + PAT_b = PAT_c$ (Rs in crore)	486.00
SFC's EPS before merger (EPS_a) (Rs)	2.56
Maximum number of SFC's shares maintaining EPS of Rs 2.56: (486/2.56) (crore)	189.84
SFC's (the acquiring firm) outstanding shares before merger (N_a) (crore)	157.50
Maximum number of shares to be exchanged without diluting EPS: (189.84–157.50) (crore)	32.34

SFC would be offering 18.34 crore shares for 25 crore outstanding shares of Excel, which means 0.734 shares of SFC for one share of Excel or a **swap ratio** of 0.734:1. The book value of SFC's share in 2004 is Rs 27.49 while that of Excel is Rs 29.20. Thus, SFC alternatively could offer 0.94 shares for each outstanding share of Excel without diluting its present book value. Since it is exchanging only 0.734 shares, its book value of equity should increase.

Impact on Earnings per Share Would SFC's EPS be diluted if it exchanged 18.34 crore shares to Excel? Or, what is the maximum number of shares, which SFC could exchange without diluting its EPS? Let us assume the earnings of both firms at 2004 level. We can calculate the maximum number of SFC's shares to be exchanged for Excel's shares without diluting the former company's EPS after merger as shown in Table 9.8.

We can also directly calculate the maximum number of shares as follows:

Maximum number of share to be exchanged without EPS dilution

$$= \frac{\text{Acquiring firm's post-merger earnings}}{\text{Acquiring firm's pre-merger EPS}} - \text{Acquiring firm's pre-merger shares}$$

$$= \frac{PAT_a + PAT_b}{EPS_a} - N_a$$

$$= \frac{403 + 83}{2.56} - 157.5 = 32.34 \text{ crore}$$

Thus SFC (the acquiring firm) could exchange 1.294 (i.e., 32.34/25) of its shares for one share of Excel (the acquired firm) without diluting its EPS after merger. Since it is exchanging only 0.734 shares, its EPS after merger would be as shown below:

SFC's PAT after merger (Rs 403 crore + Rs 83 crore)	486.00
Number of shares after merger (157.50 + 18.34)	175.84
SFC's EPS after merger: 486/175.84	2.76

Table 11.9 summarizes the effect of the merger of Excel with SFC on EPS, market value and price-earning ratio with an exchange ratio of 0.734.

Table 11.9: Merger of Excel with SFC: Impact on EPS, Book Value, Market Value and P/E Ratio

	SFC (before merger)	***Excel***	***SFC (after merger)***
1. Profit after tax (Rs in crore)	403.00	83.00	486.00
2. Number of shares (crore)	157.50	25.00	175.84
3. EPS (Rs)	2.56	3.32	2.76
4. Market value per share (Rs)	57.80	24.90	57.80
5. Price-earnings ratio (times)	22.60	7.50	20.94
6. Total market capitalisation (Rs in crore)	9,104	1,060	10,164

Notes:

(*a*) In line 2 SFC's number of shares after merger would be: 157.5 + (0.734 × 25) = 175.84 crore.

(*b*) In line 6, the value of Excel's share is based on its evaluation by SFC reflecting future growth and cost savings. At the current market value of Rs 24.90, the market capitalisation in Rs 622.50 crore.

(*c*) Market value per share after merger would be: Rs 10,164/175.84 = Rs 57.80.

You may observe that for Excel's (the acquired firm) pre-merger EPS of Rs 3.32, the price paid is Rs 42.40. Thus, the price-earnings ratio *paid* to Excel is: Rs 42.40/3.32 = 12.2 times. Since the price-earnings ratio exchanged is less than SFC's (the acquiring firm) price-earnings ratio of 22.6, SFC's EPS after merger increases. However, in terms of value, there is no change. In fact, the post merger price-earnings ratio falls to: Rs 57.8/Rs 2.76 = 20.94 times.

We can notice from Table 11.9 that after merger the market value per share is Rs 57.80 and total capitalisation increases to Rs 10,164 crore, more by Rs 437.50 crore of the sum of the capitalization of individuals firms (Rs 57.80 × 157.50 crore plus Rs 24.90 × 25 crore) = Rs 9,104 crore + Rs 622.50 crore = Rs 9,726.50 crore. This increased wealth, however, does not benefit the shareholders of SFC since it is entirely transferred to Excel's shareholders as shown below:

Total capitalisation of Excel's shareholders after merger (Rs in crore)	1,060.00
Total capitalisation of Excel's shareholders before merger (Rs in crore)	622.50
Net gain (Rs in crore)	437.50

Would the shareholders of SFC gain if there was no economic gain from the merger and the exchange ratio was in terms of the current market price of the two companies' shares? The market price **share exchange ratio** (SER) would be:

$$\text{SER} = \frac{\text{Share price of acquired firm}}{\text{Share price of the acquiring firm}} = \frac{P_b}{P_a} = \frac{24.90}{57.80} = 0.431 \qquad (2)$$

***Bootstrapping*:** SFC would issue 10.77 (i.e., 25 × 0.431) shares to Excel in terms of current prices SER. Does the acquiring firm benefit if shares are exchanged in proportion of the current share prices? Let us assume that there are no benefits of acquisition. Table 11.10 summaries the impact of the share exchange in terms of the current market prices (without any gain from merger/

NOTES

acquisition). SER at current share prices implies that the acquiring company (SFC) pays no premium to the acquired company (Excel).

Table 11.10: Impact of the Acquisition of Excel by SFC: SER 0.431

	SFC (before merger)	*Excel*	*SFC (after merger)*
1. Profit after tax (Rs in crore)	403.00	83.00	486.00
2. Number of shares (crore)	157.50	25.00	168.30
3. EPS (Rs)	2.56	3.32	2.89
4. Market value per share (Rs)	57.80	24.90	57.80
5. Price-earnings ratio (times)	22.60	7.50	20.00
6. Total market capitalisation (Rs in crore)	9,104.00	622.50	9,726.50

Notes:

(*a*) In line 2 SFC's number of shares after merger would be: 157.50 + (0.431 × 25) = 168.30 crore.

(*b*) In line 6, the value of Excel's share is taken as the current market price.

(*c*) Market value per share after merger would be: Rs 9,726.50/168.30 = Rs 57.80.

There is no gain from the merger and the market value after acquisition of Excel remains the same. However, SFC is able to increase its EPS from Rs 2.56 to Rs 2.89 after acquisition. The reason is that its profit after tax increases by 20.6 per cent after acquisition while the number of shares increases by 6.9 per cent only. The price-earnings ratio declines to 20 (P/E = Rs 57.8/2.89 = 20) as there is no change in the market value per share and EPS increases after merger. This is known as the **bootstrapping phenomenon**, and it creates an illusion of benefits from the merger.[10] Once again, it may be noticed that the price-earnings ratio exchanged by the acquiring firm (SFC), Rs 24.9/Rs 3.32 = 7.50 is less than its price-earnings ratio, and this resulted in higher EPS for the acquiring firm.

In case of Excel's acquisition by SFC, there is expected to be increase in Excel's capitalisation due to improvement in profit margin and operating efficiencies. We have seen earlier that if the exchange ratio is 0.734, the entire gain is transferred to the shareholders of Excel. Possibly, Excel's shares would remain 'under valued', if SFC does not acquire it. Can a negotiation take place so that the shareholders of SFC also gain from the increased wealth from merger? Let us assume economic gain (Rs 1,060 – Rs 622.5 = Rs 437.5 crore) and SER in terms of the current market value of two companies, i.e., 0.431. The effect is shown in Table 11.11.

Table 11.11: Impact of the Acquisition of Excel by SFC: SER 0.431

	SFC (before merger)	*SFC Excel*	*(after merger)*
1. Profit after tax (Rs in crore)	403.00	83.00	486.00
2. Number of shares (crore)	157.50	25.00	168.30
3. EPS (Rs)	2.56	3.32	2.89
4. Market value per share (Rs)	57.80	24.90	60.39
5. Price-earnings ratio (times)	22.50	7.50	21.40
6. Total market capitalisation (Rs in crore)	9,104.00	1,060.00	10,164.00

Notes:

(*a*) In line 2, SFC's number of shares after merger would be: 157.50 + (0.431 × 25) = 168.30 crore.

(*b*) In line 6, the value of Excel's share is taken as Rs 1,060 crore, which is based on its evaluation by SFC reflecting future growth and cost savings. .

(*c*) Market value per share after merger would be: Rs 10,164/168.30 = Rs 60.39.

10. Myers, S.C., A Framework for Evaluating Mergers, *Modern Developments in Financial Management*, S.C. Myers (ed.), Praeger, 1976. Also see Brealey and Myers, *op. cit*., p. 825.

We may observe from Table 11.12 that the market value of SFC's share is expected to be higher (Rs 60.39) after merger as compared to the before-merger value (Rs 57.80). Shareholders of both Excel and SFC, as shown below, share the net increase in wealth:

(Rs in crore)

Gain to SFC's (the acquiring firm) shareholders:	
$(P_{ab} - P_a)N_a = (60.39 - 57.80) \times 157.50$	409.00
Gain to Excel's (the acquired firm shareholders):	
$P_{ab} \times (N_a + (\text{SER})\, N_b - P_b \times N_b = 60.39 \times 10.78 - 24.90 \times 25$	28.50
Total gain:	
$P_{ab} \times (N_a + (\text{SER})\, N_b) - (P_a \times N_a + P_b \times N_b)$	
= 60.39 (157.5 + 0.431 × 25) – (57.8 × 157.5 + 24.9 × 25)	437.50

Thus, the distribution of the merger gain between the shareholders of the acquiring and target companies can be calculated as follows:

$$\begin{aligned}\text{Merger gain} &= \text{Gain to the acquiring company's shareholders} + \text{Gain to the acquired company's shareholders} \\ &= (P_{ab} - P_a)\, N_a + P_{ab}\ (N_a + \text{SER}\ (N_b) - P_b \times N_b \qquad (3)\end{aligned}$$

where P_{ab} is the price per share after merger, P_a before-merger share price of the acquiring company, P_b before-merger share price of the target company, N_a before-merger number of shares of the acquiring company, N_b before-merger number of shares of the target company and SER is the share exchange ratio. Using Equation (3), the merger gain for the shareholders of SFC and Excel in Illustration 11.2 can be computed as follows:

$$1{,}060 - 622.50 = (60.4 - 57.8)\ 157.5 + [60.4 \times (24.9/57.8)\ (25) - 24.9 \times 25]$$

$$437.50 = 2.60 \times 157.5 + [60.4 \times (0.431)\ 25 - 24.9 \times 25]$$

$$= 408.0 + 29.5 = \text{Rs } 437.50 \text{ crore}$$

We may observe that the market value per share of the combined firm (P_{ab}) is higher than that of the acquiring or the acquired firm because of the operating economies and improved margin in the operation of the acquired firm. Thus the total gain is also equal to the fair value of Excel's shares (Rs 1,060 crore) minus the current market capitalization (Rs 622.5), i.e., Rs 437.50.

11.9 MERGER NEGOTIATIONS: SIGNIFICANCE OF P/E RATIO AND EPS ANALYSIS

In practice, investors attach a lot of importance to the earnings per share (EPS) and the price-earnings (P/E) ratio. The product of EPS and P/E ratio is the market price per share. In an efficient capital market, the market price of a share should be equal to the value arrived by the DCF technique. In reality, a number of factors may cause a divergence between these two values. Thus, in addition to the market price and the discount value of shares, the mergers and acquisitions decisions are also evaluated in terms of EPS, P/E ratio, book value etc. We have already discussed the impact of merger on these variables in the case of the merger of SFC and Excel (Illustration 11.2). In this section, we extend the discussion in a more formal manner in the context of the negotiations in terms of exchange of shares.

11.9.1 Share Exchange Ratio

In practice, in a number of deals, the current market values of the acquiring and the acquired firms are taken as the basis for exchange of shares. As discussed earlier, the share exchange ratio (SER) would be as follows:

Check Your Progress

13. What are the various ways of financing a merger?

NOTES

$$\text{Share exchange ratio} = \frac{\text{Share price of the acquired firm}}{\text{Share price of the acquiring firm}}$$

$$= \frac{P_b}{P_a}$$

The exchange ratio in terms of the market value of shares will keep the position of the shareholders in value terms unchanged after the merger since their proportionate wealth would remain at the pre-merger level. There is no incentive for the shareholders of the acquired firm, and they would require a premium to be paid by the acquiring company. Could the acquiring company pay a premium and be better off in terms of the additional value of its shareholders? In the absence of net economic gain, the shareholders of the acquiring company would become worse-off unless the price-earnings ratio of the acquiring company remains the same as before the merger. For the shareholders of the acquiring firm to be better-off after the merger without any net economic gain either the price-earnings ratio will have to increase sufficiently higher or the share exchange ratio is low, the price-earnings ratio remaining the same. Let us consider an example.

Suppose Shyama Enterprise is considering the acquisition of Rama Enterprise. The following are the financial data of two companies:

	Shyama Enterprise	***Rama Enterprise***
Profit after tax (Rs)	40,000	8,000
Number of shares	10,000	4,000
EPS (Rs)	4	2
Market value per share (Rs)	60	15
Price earnings ratio (times)	15	7.5
Total market capitalisation (Rs)	600,000	60,000

Shyama Enterprise is thinking of acquiring Rama Enterprises through exchange of shares in proportion of the market value per share. If the price-earnings ratio is expected to be (*a*) pre-merger P/E ratio of Rama, i.e., 7.5, (*b*) pre-merger P/E ratio of Shyama, i.e., 15, (*c*) weighted average of pre-merger P/E ratio of Shyama and Rama, i.e., 13.75, what would be the impact on the wealth of shareholders after merger?

Since the basis of the exchange of shares is the market value per share of the acquiring (Shyama Enterprise) and the acquired (Rama Enterprise) firms, then Shyama would offer 0.25 of its shares to the shareholders of Rama:

$$\text{SER} = \frac{P_b}{P_a} = \frac{15}{60} = 0.25$$

In terms of the market value per share of the combined firm after the merger, the position of Rama's shareholders would remain the same; that is, their per-share value would be: Rs 60 × 0.25 = Rs 15. The total number of shares offered by Shyama (the acquiring firm) to Rama's (the acquired firm) shareholders would be:

$$\begin{aligned}\text{No. of shares exchanged} &= \text{SER} \times \text{Pre-merger number of shares of the acquired firm} \\ &= (P_b / P_a)N_b = 0.25 \times 4{,}000 \\ &= 1{,}000\end{aligned}$$

The total number of shares after the merger would be: N_a + (SER) N_b = 10,000 + 1,000 = 11,000. The combined earnings (PAT_c) after the merger would be: Rs 40,000 + Rs 8,000 = Rs 48,000 and EPS after the merger would be:

$$\text{Post-merter combined EPS} = \frac{\text{Post-merger combined PAT}}{\text{Post-merger combined shares}}$$
$$= \frac{PAT_a + PAT_b}{N_a + (SER)\,N_b}$$
$$= \frac{40,000 + 8,000}{10,000 + (0.25)\ \ 4,000} \quad (4)$$
$$= \frac{48,000}{11,000} = \text{Rs } 4.36$$

The earnings per share of Shyama (the acquiring firm) increased from Rs 4 to Rs 4.36, but for Rama's (the acquired firm) shareholders, it declined from Rs 2 to Rs 1.09; that is, Rs 4.36 × 0.25 = Rs 1.09.

Given the earnings per share after the merger, the post-merger market value per share would depend on the price-earnings ratio of the combined firm. How would P/E ratio affect the wealth of shareholders of the individual companies after the merger? Table 11.12 shows the impact.

Table 11.12: Rama and Shyama Enterprises: P/E Ratio and Effect on Value

		Combined Firm's	*Market value: Shyama*		*Market value: Rama*	
P/E Ratio	***EPS After Merger***	***Market Value After Merger***	***Before merger***	***After merger***	***Before merger***	***After merger***
7.50	4.36	32.70	60.00	32.70	15.00	8.18
15.00	4.36	65.40	60.00	65.40	15.00	16.35
13.75	4.36	60.00	60.00	60.00	15.00	15.00

Notes:

(*a*) Shyama's share price after merger is equal to its EPS of Rs 4.36 times the P/E ratio.

(*b*) Rama's share price after merger is equal to its share of EPS, Rs 1.09 times P/E ratio.

Note that Rama's shareholders' value in terms of their shareholding in Shyama is: MV after merger × 0.25. We can observe from Table 11.12 that the shareholders of both the acquiring and the acquired firms neither gain nor lose in value terms if post-merger P/E ratio is merely a weighted average of pre-merger P/E ratios of the individual firms. The post-merger weighted P/E ratio is calculated as follows:

Post-merger weighted P/E ratio:

(Pre-merger P/E ratio of the acquiring firm) × (Acquiring firm's pre-merger earnings × Post-merger combined earnings) + (Pre-merger P/E ratio of the acquired firm) × (Acquired firm's pre-merger earnings × Post-merger combined earnings)

$$P/E_w = (P/E_a)(PAT_a / PAT_c) + (P/E_b) \times (PAT_b / PAT_c) \quad (5)$$

Using Equation (5) in our example, we obtain:

= (15) (40,000/48,000) + (7.5) (8,000/48,000)

= 12.5 + 1.25 = 13.75

The acquiring company would lose in value if post-merger P/E ratio is less than the weighted P/E ratio. Any P/E ratio above the weighted P/E ratio would benefit both the acquiring as well as the acquired firms in value terms. An acquiring firm would always be able to improve its earnings per share after the merger whenever it acquires a company with a P/E ratio lower than its own P/E ratio. The higher EPS need not necessarily increase the share price. It is the quality of EPS rather than the quantity that would influence the price.

An acquiring firm would lose in value if its post-merger P/E ratio is less than the weighted P/E ratio. Shyama Enterprise would lose Rs 27.30 value per share if P/E ratio after merger was 7.5 Any

NOTES

P/E ratio above the weighted P/E ratio would benefit both the acquiring as well as the acquired firm in value terms. When the post-merger P/E ratio is 15, Shyama gains Rs 5.40 value per share and Rama Rs 1.35.

Why does Shyama Enterprise's EPS increase after merger? It increases because it has a current P/E ratio of 15, and it is required to exchange a lower P/E ratio:

$$\text{P/E exchanged} = \frac{\text{SER} \times P_a}{\text{EPS}_b} = \frac{0.25 \times 60}{2} = 7.5 \quad (6)$$

Shyama Enterprise's EPS after merger would be exactly equal to its pre-merger EPS if P/E ratio paid is equal to its pre-merger P/E ratio of 15. In that case, given Rama's EPS of Rs 2, the price paid would be Rs 30 or a share exchange ratio of 0.5. Thus, Shyama Enterprise would issue 0.5 × 4,000 = 2,000 shares to Rama Enterprise. The acquiring firm's EPS after merger would be: Rs 48,000/ 12,000 = Rs 4. It may be noticed that at this P/E ratio, Shyama's shareholders would have the same EPS as before the merger: 0.5 × Rs 4 = Rs 2. It can be shown that if the acquiring firm takes over another firm by exchanging a P/E ratio higher than its P/E ratio, its EPS will fall and that of the acquired firm would increase after the merger.[11]

Let us assume in our illustration that Shyama exchanges a P/E ratio of 22.5 to acquire Rama. This implies a price of Rs 45 per share and a share exchange ratio of 0.75. The earnings per share after acquisition would be as follows:

$$\text{Post-merger EPS} = \frac{40{,}000 + 8{,}000}{10{,}000 + 0.75 \times 4{,}000} = \frac{48{,}000}{13{,}000} = \text{Rs } 3.69$$

Thus, the acquiring firm's EPS falls (from Rs 4 to Rs 3.69) and the acquired firm's EPS increases (from Rs 2 to Rs 3.69 × 0.75 = Rs 2.77).

11.9.2 Earnings Growth

At share exchange ratio, based on the current market values, Shyama's (the acquiring firm) EPS falls. Should it acquire Rama? It can acquire Rama if its (Rama's) future earnings are expected to grow at a higher rate. After acquisition, Shyama's EPS would increase faster than before since the future growth rate would be the weighted average of the growth rates of the merging firms.

Let us assume that Shyama's EPS is expected to grow at 6 per cent and Rama's at 15 per cent. The weighted EPS growth for Shyama would be:

$$g_w = 0.06 \times \frac{40{,}000}{48{,}000} + 0.15 \times \frac{8{,}000}{48{,}000} = 0.075 \text{ or } 7.5 \text{ per cent}$$

Thus, the formula for weighted growth in EPS can be expressed as follows:

Weighted Growth in EPS = Acquiring firm's growth × (Acquiring firm's pre-merger PAT/combined firm's PAT) + Acquired firm's growth × (Acquired firm's pre-merger PAT/combined firm's PAT)

$$g_w = g_a \times \frac{\text{PAT}_a}{\text{PAT}_c} + g_b \times \frac{\text{PAT}_b}{\text{PAT}_c} \quad (7)$$

where g_w is the weighted average growth rate after the merger, g_a and EPS_a are growth rate and earnings per share respectively of the acquiring firm before the merger, g_b and EPS_b are growth rate and the earnings per share of the acquired firm before the merger, EPS_c earnings per share of the combined firm after merger.

Table 11.13 shows the future EPS of Shyama with and without merger.

We can see from Table 11.13 and Figure 11.1 that without merger, Shyama's current EPS of Rs 4.00 would grow at 6 per cent per year and with merger the diluted EPS of Rs 3.69 would grow at 7.5 per cent (the weighted average growth rate). Shyama's EPS with merger would remain depressed until five years after merger. Its EPS, however, would start growing faster after five years.

11. Weston, J.F. and Copeland, T.E., *Managerial Finance*, Dryden, 1986, p. 918.

Table 11.13: Shyama's EPS with and without Merger (Rs)

Year	*Without Merger* (*g = 6%*)	*With Merger* (*g = 7.5%*)
0	4.00	3.69
1	4.24	3.97
2	4.49	4.26
3	4.76	4.58
4	5.05	4.93
5	5.35	5.30
6	5.67	5.69
7	6.01	6.12
8	6.38	6.58
9	6.76	7.07
10	7.16	7.60
15	9.59	10.92
20	12.83	15.67

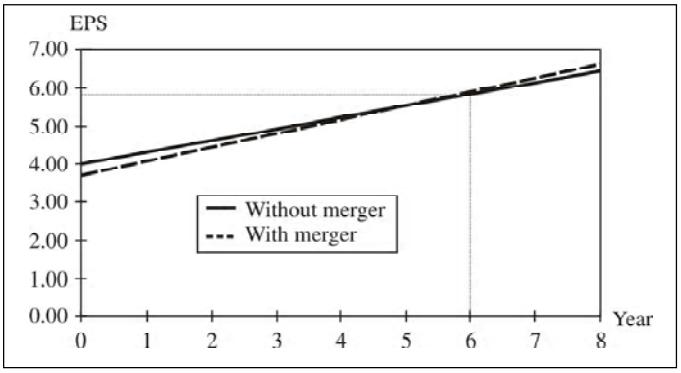


Figure 11.1: EPS with and without merger

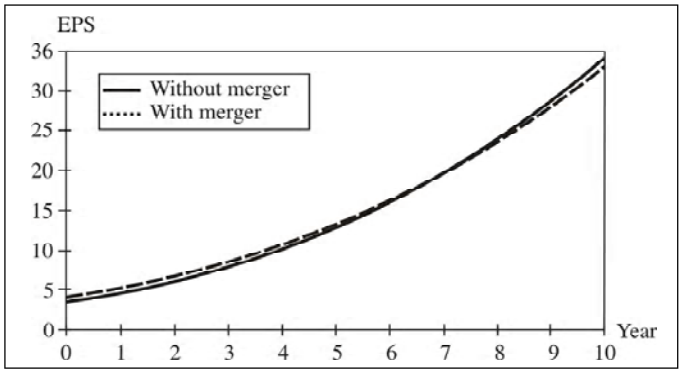


Figure 11.2: EPS with and without merger

In fact, Shyama has a higher P/E ratio that is an indication of the investors' expectation of high future growth. Therefore, it is more likely that it would grow rapidly. Under such situation, it would not pay any premium to Rama. At a share exchange ratio of 0.25, Shyama's EPS after merger would be Rs 4.36. Assume that its earnings are expected to grow at 24 per cent and Rama's at 15 per cent. How would Shyama's EPS behave with or without merger? This is shown in Table 11.14 and Figure 11.2. It may be observed that merger would help the acquiring company to grow rapidly (than without merger) for seven years after merger. After seven years, the position would reverse. Thus, the company would either acquire other companies with lower P/E ratios, or improve its operating efficiency and continue growing.

NOTES

Table 11.14: Shyama's EPS with and without Merger

Year	*Without merger (g = 24%)*	*With merger (g = 22.5%)*
0	4.00	4.36
1	4.96	5.34
2	6.15	6.54
3	7.63	8.01
4	9.46	9.82
5	11.73	12.03
6	14.54	14.73
7	18.03	18.05
8	22.36	22.11
9	27.72	27.08
10	34.37	33.18
15	100.78	91.52
20	295.46	252.47

It should be obvious from calculation in Tables 11.13 and 11.14 as well as from Figures 11.1 and 11.2 that the important factors influencing the earnings growth of the acquiring firm in future are:[12]

- The price-earnings ratios of the acquiring and the acquired companies
- The ratio of share exchanged by the acquiring company for one share of the acquired company
- The pre-merger earnings growth rates of acquiring and the acquired companies
- The level of profit after-tax of the merging companies
- The weighted average of the earnings growth rates of the merging companies.

11.10 TENDER OFFER AND HOSTILE TAKEOVER

A **tender offer** is a formal offer to purchase a given number of a company's shares at a specific price. The acquiring company asks the shareholders of the target company to "tender" their shares in exchange for a specific price. The price is generally quoted at a premium in order to induce the shareholders to tender their shares. Tender offer can be used in two situations. First, the acquiring company may directly approach the target company for its takeover. If the target company does not agree, then the acquiring company may directly approach the shareholders by means of a tender offer. Second, the tender offer may be used without any negotiations, and it may be tantamount to a **hostile takeover**. The shareholders are generally approached through announcement in the financial press or through direct communication individually. They may or may not react to a tender offer. Their reaction exclusively depends upon their attitude and sentiment and the difference between the market price and the offered price. The tender offer may or may not be acceptable to the management of the target company. In the USA, the tender offers have been used for a number of years. In India, one may see only one or two instances of tender offer in the recent years.

Check Your Progress

14. Under what conditions would the shareholders of both the acquiring company and acquired company both gain under a merger?

In September 1989, Tata Tea Ltd. (TTL), the largest integrated tea company in India, made an open offer for controlling interest to the shareholders of the Consolidated Coffee Ltd. (CCL). TTL's Chairman, Darbari Seth, offered one share in TTL and Rs 100 in cash (which is equivalent of Rs 140) for a CCL share that was then quoting at Rs 88 on the Madras Stock Exchange. TTL's decision is not only novel in the Indian corporate sector but also a trendsetter. TTL had notified in the financial press about its intention to buyout some tea estates and solicited offers from the shareholders concerned.

12. Weston and Copeland, *op. cit.*, pp. 901–03.

The management of the target company generally do not approve of tender offers. The major reason is the fear of being replaced. The acquiring company's plans may not be compatible with the best interests of the shareholders of the target company.

The management of the target company can try to convince its shareholders that they should not tender their shares since the offer value is not enough in the light of the real value of shares, i.e., the offer is too low comparative to its real value. The management may use techniques to dissuade its shareholders from accepting tender offer. For example, it may lure them by announcing higher dividends. If this helps to raise the share price due to psychological impact or information content, then the shareholders may not consider the offer price tempting enough. The company may issue bonus shares and/or rights shares and make it difficult for the acquirer to acquire controlling shares.

The target company may also launch a counter-publicity programme by informing that the tender is not in the interest of the shareholders. If the shareholders are convinced, then the tender offer may fail. The target company can follow delay tactics and try to get help from the regulatory authorities such as the Securities and Exchange Board of India (SEBI), or the Stock Exchanges of India.

11.10.1 Defensive Tactics

A target company in practice adopts a number of tactics to defend itself from hostile takeover through a tender offer. These tactics include a divestiture or spin-off, poison pill, greenmail, white knight, crown jewels, golden parachutes, etc.[13]

- ***Divestiture*** In a *divestiture* the target company divests or spins off some of its businesses in the form of an independent, subsidiary company. Thus, it reduces the attractiveness of the existing business to the acquirer.
- ***Crown jewels*** When a target company uses the tactic of divestiture it is said to sell the *crown jewels*. In some countries such as the UK, such tactic is not allowed once the deal becomes known and is unavoidable.
- ***Poison pill*** An acquiring company itself could become a target when it is bidding for another company. The tactics used by the acquiring company to make itself unattractive to a potential bidder is called *poison pills*. For example, the acquiring company may issue substantial amount of convertible debentures to its existing shareholders to be converted at a future date when it faces a takeover threat. The task of the bidder would become difficult since the number of shares to have voting control of the company will increase substantially.
- ***Greenmail*** Greenmail refers to an incentive offered by management of the target company to the potential bidder for not pursuing the takeover. The management of the target company may offer the acquirer for its shares a price higher than the market price.
- ***White knight*** A target company is said to use a *white knight* when its management offers to be acquired by a friendly company to escape from a hostile takeover. The possible motive for the management of the target company to do so is not to lose the management of the company. The hostile acquirer may replace the management.
- ***Golden parachutes*** When a company offers hefty compensations to its managers if they get ousted due to takeover, the company is said to offer *golden parachutes*. This reduces their resistance to takeover.

11.11 CORPORATE STRATEGY AND ACQUISITIONS

In our earlier discussion, we made distinctions between merger and acquisition or takeover. However, they generally involve similar analyses and evaluations. A merger or acquisition might be considered successful if it increases the shareholder value. Though it is quite difficult to say how the firm would have performed without merger or acquisition, but the post-merger poor

NOTES

Check Your Progress

15. What is a tender offer in an acquisition offer? When does a tender offer become a hostile takeover?
16. List some of the defensive tactics that a target company may adopt in order to defend itself from hostile takeover?
17. What does defensive tactics mean?
18. Write a short note on tender offer?

13. For a detailed explanation of the takeover defences, see Weston, J.I., Chung, K.S., and Hoag, S.E., *Mergers, Restructuring, and Corporate Control*, Prentice-Hall, New Delhi, 1996, pp. 481–529.

NOTES

performance would be attributed as a failure of merger or acquisition. What are the chances that mergers or acquisitions would succeed? Empirical evidence shows that there is more than fifty per cent chance that they would succeed.

There are several reasons responsible for the failure of a merger or acquisition. They include :

- ***Excessive premium*** An acquirer may pay high premium for acquiring its target company. The value paid may far exceed the benefits. This happens when acquirer becomes to eager to acquire the target for prestige or increasing the size of its empire.
- ***Faulty evaluation*** At times acquirers do not carry out the detailed diligence of the target company. They make a wrong assessment of the benefits from the acquisition and land up paying a higher price.
- ***Lack of research*** Acquisition requires gathering a lot of data and information and analyzing it. It requires extensive research. A shoddily carried out research about the acquisition causes the destruction of the acquirer's wealth.
- ***Failure to manage post-merger integration*** Many times acquirers are unable to integrate the acquired companies in their businesses. They overlook the organisational and cultural issues. They do not have adequate understanding of the culture of the acquired companies which creates problem of integration and synergy.

To avoid these problems, the acquiring company needs to have an acquisition and merger strategy. All acquisitions must be seen as strategic. The acquisition should be well planned; target companies should be carefully selected after adequate screening. The acquiring company must understand the organisational climate and culture of the target company while performing the due diligence.

There are four important steps involved in a decision regarding merger or acquisition[14]

- Planning
- Search and screening
- Financial evaluation
- Integration

11.11.1 Planning

A merger or acquisition should be seen in the over-all strategic perspective of the acquiring company. It should fit with the strategy and must contribute in the growth of the company and in creating value for shareholders and other stakeholders. The acquiring company must assess its strengths and weaknesses and likely opportunities arising from the acquisitions in order to identify the target companies.The acquiring firm should review its objective of acquisition in the context of its strengths and weaknesses, and corporate goals. This will help in indicating the product–market strategies that are appropriate for the company. It will also force the firm to identify business units that should be dropped and those that should be added or strengthened.

The following two steps are involved in the planning process:

- ***Acquisition strategy*** The company should have a well articulated acquisition strategy. It should be growth-oriented. It should spell out the objectives of acquisition and other growth options. The acquisition strategy should be formulated after an assessment of the company's own strengths and weaknesses.
- ***Assessment approaches and criteria*** The company should spell out its approach to acquisitions and the criteria to be applied to acquisitions.

The planning of acquisition will require the analysis of industry-specific and the firm-specific information. The acquiring firm will need industry data on market growth, nature of competition, ease of entry, capital and labour intensity, degree of regulation etc. About the target firm the information needed will include the quality of management, market share, size, capital structure, profitability, production and marketing capabilities etc.

14. In Rappaport, A., *op. cit.*, pp. 99–110, the first three steps are focused.

11.11.2 Search and Screening

Search focuses on how and where to look for suitable candidates for acquisition. Screening process shortlists a few candidates from many available. Detailed information about each of these candidates is obtained. Merger objectives would be the basis for search and screening. The objectives may include attaining faster growth, improving profitability, improving managerial effectiveness, gaining market power and leadership, achieving cost reduction etc. These objectives can be achieved in various ways rather than through mergers alone. The alternatives to merger include joint ventures, strategic alliances, elimination of inefficient operations, cost reduction and productivity improvement, hiring capable managers etc. If merger is considered as the best alternative, the acquiring firm must satisfy itself that it is the best available option in terms of its own screening criteria and economically most attractive.

11.11.3 Financial Evaluation

Financial evaluation is the most important part of **due diligence**. Due diligence would also include evaluation of the target company's organisational climate and culture, competencies and skills of employees etc. Financial evaluation of a merger is needed to determine the earnings and cash flows, areas of risk, the maximum price payable to the target company and the best way to finance the merger. The acquiring firm must pay a fair consideration to the target firm for acquiring its business. In a competitive market situation with capital market efficiency, the current market value is the correct and fair value of the share of the target firm. The target firm will not accept any offer below the current market value of its share. The target firm may, in fact, expect the offer price to be more than the current market value of its share since it may expect that merger benefits will accrue to the acquiring firm. A merger is said to be at a premium when the offer price is higher than the target firm's pre-merger market value. The acquiring firm may pay the premium if it thinks that it can increase the target firm's profits after merger by improving its operations and due to synergy. It may have to pay premium as an incentive to the target firm's shareholders to induce them to sell their shares so that the acquiring firm is enabled to obtain the control of the target firm.

11.11.4 Integration

The most difficult part of the merger or acquisition is the integration of the acquired company into the acquiring company. In the case of a hostile takeover, the acquiring company may get disappointed to find the inferior quality of the acquired firm's assets and employees. The difficulty of integration also depends on the degree of control desired by the acquirer. The acquirer may simply desire financial consolidation leaving the entire management to the existing managers. On the other hand, if the intention is total integration of manufacturing, marketing, finance, personnel etc., integration becomes quite complex.

A horizontal merger or acquisition requires a detailed planning for integration.

- ***Integration plan*** After the merger or acquisition, the acquiring company should prepare a detailed strategic plan for integration based on its own and the acquired company's strengths and weaknesses. The plan should highlight the objectives and the process of integration.
- ***Communication*** The integration plan should be communicated to all employees. The management should also inform the employees about their involvement in making the integration smooth and easy and remove any ambiguity and fears in the minds of the staff.
- ***Authority and responsibility*** The first step that the acquiring company should take is to take all employees into confidence and decide the authority and responsibility relationships. The detailed organisational structure can be decided upon later on. This is essential to avoid any confusion and indecisiveness.
- ***Cultural integration*** People management is the most critical step in integration. A number of mergers and acquisitions fail because of the failure of management to integrate people from two different organisations. Management should focus the culture integration of the employees. A proper understanding of the cultures of two organisations, clear communication and training can help to bridge the cultural gaps.

NOTES

- ***Skill and competencies up-gradation*** If there is difference in the skills and competencies of employees of the merging companies, management should prepare a plan for skill and competencies up-gradation through training and implement it immediately. To make an assessment of the gaps in the skills and competencies, the acquiring company can conduct a survey of employees.
- ***Structural adjustments*** After affecting the cultural integration and skills up-gradation, management may design the new organization structure and redefine the roles, authorities and responsibilities. Management should be prepared to make adjustments to accommodate the aspirations of the employees of the acquired company.
- ***Control systems*** Management must ensure that it is in control of all resources and activities of the merged firms. It must put proper financial control in place so that resources are optimally utilized and wastage is avoided.

Peter Drucker provides the following five rules for the integration process:[15]

- Ensure that the acquired firm has a "common core of unity" with the parent. They should have overlapping characteristics like shared technology or markets to exploit synergies.
- The acquirer should think through what potential skill contribution it can make to the acquiree.
- The acquirer must respect the products, markets and customers of the acquired firm.
- The acquirer should provide appropriately skilled top management for the acquiree with in a year.
- The acquirer should make several cross-company promotions within a year.

11.11.5 Post-merger Integration: Integrating VSNL with Tata Group[16]

Tata Group acquired VSNL in February 2002. Tata Group is the most respected group of companies in private sector. VSNL is a public sector company. These two companies belonged to two different environments, systems and culture. Both had committed people but with capabilities and expectations. Hence the task of integration was quite difficult and demanding. Tata Group's primary focus to protect its 'market position in the ILD business, get the national long-distance business launched as soon as possible, and work on making the operations of the company more market/customer focused and efficient'. The integration process involved the following steps :

- The Tata Group constituted multiple task forces for the purpose prioritising tasks and achieving objectives.
- The Group simultaneously focused on the integration of operations, processes and technology and people.
- The people issue was considered as important as the integration of operations, processes and technology.
- A special programme called 'Confluence' was conducted for the senior management team from VSNL. They were informed about Tata Group's the mission, value systems and practices. Similar programmes were organised for more than 500 employees.
- A people driven organisational restructuring was undertaken at headquarters simultaneously as the employees were being trained. Employees from different backgrounds, disciplines and levels discussed about the organisational roles, structure and responsibility relationship. After the headquarters, the focus was to the regional and branch offices for the similar initiatives.
- Several new functions were created. Weak were strengthened and supplemented by sales and marketing people brought in from other Tata Group companies. These areas included carrier relations to work with domestic and international telecom carriers, OSP or outside plant to implement the countrywide fibre optic backbone for NLD, and customer services.

15. Drucket, P.F., "Five Rules for Successful Acquisition", *Wall Street Journal*, 15 October, 1981.
16. This section draws from "The Integrated Approach", Mr. *N. Srinath, Director (Operations), VSNL, as spoke to Christabelle Noronha:* http://www.tata.com/vsnl/articles/20030526_the_integrated_approach.htm May 27, 2003.

- The employees were trained to take up the new roles and challenges, and to strengthen their marketing skills to focus on customer. Training programmes were organised on functional areas.
- A management development programme was conducting focusing on critical commercial skills like business management, people and performance management, negotiating skills, and planning and budgeting skills. A key part of this exercise was that Tata Group executives, who are operating managers, were invited to share their experiences as managers with the VSNL teams.
- Information about initiatives or changes was communicated through new processes. The house magazine, *Patrika*, was supplemented with a monthly wallpaper called *VSNL Buzz*, which shared information about important developments within the company — new customer wins, major milestones achieved, new technical and product developments, etc.—to make the employee feel proud to be part of the VSNL and Tata family.
- Periodic briefing sessions, at which members of the management spoke on the recent performance and achievements in the company, were also started.
- The existing processes could not give the company the competitive edge in the marketplace. Hence, VSNL is restructuring a few of internal processes, ranging from product development to service delivery. It has also begun leveraging the experience and processes available in the Tata Group telecom companies in marketing, customer acquisition and customer services. Many of these are applicable to VSNL, though with fine-tuning to meet specific requirements.
- The first areas to be re-engineered will be those that impact the customer. A structure is planned that is aligned with the industry best practices in customer care.
- Customer service is being broken down into four functions. The first is the customer access point, the call centre or the public office. The second is the backend that handles the issues, queries or complaints received by the front office. The third function is credit and collection; the fourth is that of order management.

Mr. Srinath, Director (Operations), VSNL says: "We realise that our most valuable asset, across all our businesses, is people. They are the repository of business experience and culture, and the outward face of the company to the client. This combination of structures, skills and processes, supported by the right tools, should provide our employees a healthy work environment to enable them to reach their full potential, while facilitating the company's drive to achieve all its objectives in the marketplace".

11.12 ACCOUNTING FOR MERGERS AND ACQUISITIONS

Mergers and acquisitions involve complex accounting treatment. A merger, defined as amalgamation in India, involves the absorption of the target company by the acquiring company, which results in the uniting of the interests of the two companies. The merger should be structured as pooling of interest. In the case of acquisition, where the acquiring company purchases the shares of the target company, the acquisition should be structured as a purchase.

11.12.1 Pooling of Interests Method

In the **pooling of interests method** of accounting, the balance sheet items and the profit and loss items of the merged firms are combined without recording the effects of merger. This implies that asset, liabilities and other items of the acquiring and the acquired firms are simply added at the book values without making any adjustments. Thus, there is no revaluation of assets or creation of goodwill. Let us consider an example as given in Illustration 11.3.

Check Your Progress

19. Mention some of the reasons why a corporate merger may fail.

Illustration 11.3: Pooling of Interest

Firm *T* merges with Firm *S*. Firm *S* issues shares worth Rs 15 crore to Firm *T*'s shareholders. The balance sheets of both companies at the time of merger are shown in Table 11.15. The balance sheet of Firm *S* after

NOTES

merger is constructed as the addition of the book values of the assets and liabilities of the merged firms. It may be noticed that the shareholders funds are recorded at the book value, although *T*'s shareholders received shares worth Rs 15 crore in Firm *S*. They now own Firm *S* along with its existing shareholders.

Table 11.15: Pooling of Interests Method: Merger of Firms S and T

(***Rs in crore***)

			Combined
	Firm T	***Firm S***	***Firm***
Assets			
Net fixed assets	24	37	61
Current assets	8	13	21
Total	32	50	82
Liabilities			
Shareholders Fund	10	18	28
Borrowings	16	20	36
Current liabilities	6	12	18
Total	32	50	82

11.12.2 Purchase Method

Under the **purchase method**, the assets and liabilities of the acquiring firm after the acquisition of the target firm may be stated at their exiting carrying amounts or at the amounts adjusted for the purchase price paid to the target company. The assets and liabilities after merger are generally revalued under the purchase method. If the acquirer pays a price greater than the fair market value of assets and liabilities, the excess amount is shown as goodwill in the acquiring company's books. On the contrary, if the fair value of assets and liabilities is less than the purchase price paid, then this difference is recorded as capital reserve. Let us consider an example as given in Illustration 11.4.

Illustration 11.4: Purchase Method

Firm *S* acquires Firm *T* by assuming all its assets and liabilities. The fair value of Firm *T*'s fixed assets and current assets is Rs 26 crore and Rs 7 crore. Current liabilities are valued at book value while the fair value of debt is estimated to be Rs 15 crore. Firm *S* raises cash of Rs 15 crore to pay to *T*'s shareholders by issuing shares worth Rs 15 crore to its own shareholders. The balance sheets of the firms before acquisition and the effect of acquisition are shown in Table 11.16. The balance sheet of Firm *S* (the acquirer) after acquisition is constructed after adjusting assets, liabilities and equity.

Table 11.16: Purchase Method: Merger of Firms S and T

(Rs in crore)

	Firm T	***Firm S***	***Firm S after Merger***
Assets			
Net fixed assets	24	37	63
Current assets	8	13	20
Goodwill	—	—	3
Total	32	50	86
Liabilities			
Shareholders fund	10	18	33
Borrowings	16	20	35
Current liabilities	6	12	18
Total	32	50	86

The goodwill is calculated as follows:

Payment to *T*'s shareholders		Rs 15
Fair value of fixed assets	26	
Fair value of current assets	7	
Less: Fair value of borrowings	15	
Less: Fair value of current liabilities	6	
Fair value of net assets		12
Goodwill		Rs 3

11.13 LEVERAGED BUY-OUTS

A **leveraged buy-out** (LBO) is an acquisition of a company in which the acquisition is substantially financed through debt. When the managers buy their company from its owners employing debt, the leveraged buy-out is called **management buy-out** (MBO). Debt typically forms 70–90 per cent of the purchase price and it may have a low credit rating. In the USA, the LBO shares are not bought and sold in the stock market, and the equity is concentrated in the hands of a few investors.[17] Debt is obtained on the basis of the company's future earnings potential. LBOs generally involve payment by cash to the seller.

LBOs are very popular in the USA. It has been found there that in LBOs, the sellers require very high premium, ranging from 50 to 100 per cent. The main motivation in LBOs is to increase wealth rapidly in a short span of time. A buyer would typically go public after four or five years, and make substantial capital gains.

11.13.1 LBO Targets

Which companies are targets for the leveraged buy-outs? The following firms are generally the targets for LBOs:

- High growth, high market share firms
- High profit potential firms
- High liquidity and high debt capacity firms
- Low operating risk firms

In LBOs, a buyer generally looks for a company that is operating in a high growth market with a high market share. It should have a high potential to grow fast, and be capable to earning superior profits.[18] The demand for the company's product should be known so that its earnings can be easily forecasted. A typical company for a leveraged buy-out would be one that has high profit potential, high liquidity and low or no debt. Low operating risk of such companies allows the acquiring firm or the management team to assume a high degree of financial leverage and risk.

11.13.2 Risk and Rewards

Why is a lender prepared to assume high risk in a leveraged buy-out? A lender provides high leverage in a leveraged buy-out because he may have full confidence in the abilities of the managers-buyers to fully utilise the potential of the business and convert it into enormous value. His perceived risk is low because of the soundness of the company and its assumed, predictable performance. He would also guard himself against loss by taking ownership position in the future and retaining the right to change the ownership of the buyers if they fail to manage the company. The lender also expects a high return on his investment in a leveraged buy-out since the risk is high. He may, therefore, stipulate that the acquired company will go public after four or five years. A major portion of his return comes from capital gains.

Check Your Progress

20. Differentiate between the accounting approaches for amalgamations and acquisitions in India.

17. Brealey and Myers, *op. cit*., p. 842.
18. Weston and Copeland, *op. cit*., p. 925.

NOTES

MBOs/LBOs can create a conflict between the (acquiring) managers and shareholders of the firm. The shareholders' benefits will reduce if the deal is very attractive for the managers. This gives rise to *agency costs*. It is the responsibility of the board to protect the interests of the shareholders, and ensure that the deal offers a fair value of their shares.

Another Problem of LBOs could be the fall in the price of the LBO target company's debt instruments (bonds/debentures). This implies a transfer of wealth from debentureholders to shareholders since their claim gets diluted. Debentureholders may, thus, demand a protection in the event of a LBO/MBO. They may insist for the redemption of their claims at par if the ownership/ control of the firm changes.

11.13.3 LBO Evaluation

The evaluation of LBO transactions involves the same analysis as for mergers and acquisitions. The DCF approach is used to value an LBO. As LBO transactions are heavily financed by debt, the risk of lender is very high. Therefore, in most deals they require a stake in the ownership of the acquired firm. Illustration 11.5 provides an example of a leverage buy-out and also explains the methodology for estimating the return and the share of ownership of the lender in such deals.

Illustration 11.5: Evaluation of LBO

Hindustan Chemicals is a small size private limited company. The company manufactures a specialized industrial chemical. The large and medium size industrial companies are its buyers, and it commands about three-fourths of the market due to its excellent quality, prompt delivery and reasonable price. Suraj Bhan Gupta and Mahesh Chand Goyal own the company, both are chemical engineers and are college-days friends. The current sales of the company are Rs 99.8 lakh, and the annual sales growth rate in the past years has been 12–13 per cent. The company has been showing good profits. It has been retaining profits and financing its activities internally without resorting to any external funding. Its earnings before interest and tax (EBIT) are Rs 18.41 lakh for the current year, giving a profit margin of 18.5 per cent and a 25 per cent return on assets. Tables 11.17 and 11.18 give summary of the company's profit and loss statements and balance sheet.

Table 11.17: Hindustan Chemical Private Limited
Summary Profit and Loss Statement for the Year Ending on 31 March

(Rs in lakh)

	2000	***2001***	***2002***	***2003***	***2004***
Net sales	62.80	65.32	76.49	92.15	99.76
Less: Cost of goods sold	38.76	40.18	47.72	60.43	64.32
Gross profit	24.04	25.14	28.77	31.72	35.44
Selling and admin. expenses	(10.35)	(11.78)	(13.97)	(16.78)	(18.05)
Non-operating surplus	0.36	0.97	0.65	1.10	1.02
Profit before tax	14.05	14.33	15.45	16.04	18.41
Less: Tax	7.25	7.65	7.60	8.00	9.10
Profit after tax	6.80	6.68	7.85	8.04	9.31

Both Suraj and Mahesh have decided to retire from business. Their general manager, Brij Mohan Varsheny, has agreed to buy the entire business for Rs 100 lakh. Brij has only Rs 10 lakh of his savings, and he will have to raise the remaining amount externally. He is confident that on the basis of the strong profitability of the company, he would be able to raise funds from a private finance company, if it is offered an attractive return on its investment. The finance company may grant to him a loan of Rs 90 lakh at 10 per cent rate of interest per year plus warrants to buy enough equity shares when the company goes public to earn at least a return of 25 per cent. Brij knows that the finance company would expect him to go public after about four or five years, and would also require him to repay the principal between six to ten years in equal instalments.

Table 11.18: Hindustan Chemical Private Limited Summary Balance Sheet
as on 31 March 2004 (***Rs in lakh***)

Capital and Liabilities			***Asset***		
Capital	8.50		Net fixed assets	41.28	
Reserve	59.50		Other non-current		
Net worth		68.00	assets	2.13	
					43.41
Current Liabilities:			Current Assets:		
Creditors	4.35		Inventory	4.12	
Outstanding					
expenses	2.36		Debtors	9.15	
Tax provision	1.79	8.50	Cash	18.50	
			Others	1.32	33.09
Total Funds		76.50	Total Assets		76.50

Brij expects that for next ten years sales would grow at 25 per cent, and afterwards the growth rate may slow down. He expects EBIT as a percentage of sales to be 25 per cent. In order to maintain the sales growth, he would have to incur some capital expenditure that is likely to increase from fourth year onwards. The tax depreciation and capital expenditures are estimated as given in Table 11.20. He also expects net working capital to sales ratio to remain approximately at its present level, say, at about 24 per cent. Should Brij Mohan borrow Rs 90 lakh to buy-out Hindustan Chemicals?

Let us analyse the performance of Hindustan Chemical in the year 2004. Most important ratios are as follows:

Table 11.19: Hindustan Chemicals: Financial Performance, 2004

Net sales/Total assets	1.30
EBIT/Net sales (%)	18.45
EBIT/Total assets (%)	24.07
PAT/EBIT (%)	50.57
Total assets/Net worth (%)	1.13
PAT/Net worth (%)	13.70
CA/CL (%)	3.89
NWC/Net sales (%)	24.65

The company is highly profitable and liquid. It employs no debt. The only liabilities are current liabilities. Net worth is 89 per cent of the total funds. Net working capital to sales ratio is 24.7 per cent, and is quite high. The company can reduce level of its current assets, and release funds to finance its future growth. It is certainly an attractive company to buy. The purchase price of Rs 100 lakh seems to be quite reasonable. At the 2004 profit after tax, it gives a price multiplier of 5.43 only.

The company would have equity of Rs 10 lakh against loan of Rs 90 lakh, giving a debt-equity ratio of 9:1. In a conventional sense, this is a very high leverage, and therefore, the traditional financiers would not provide any funds to the company. However, the company is very sound, and it has the capacity to service a high level of debt. It is a market leader with three-fourths of the market share, its products have excellent quality, and it has an assured market. Thus, the company's earnings are predictable as well as the performance is expected to improve due to cost reduction and operating efficiency. Table 11.20 shows the company's expected earnings and cash flows, and reveals that it would be in a very comfortable position to service its debt.

One important consideration in this deal is that the financier expected a return of 25 per cent and issue of shares to him in the year 2009, when the company is likely to go public. The value of business should be sufficiently high so that Brij Mohan's ownership is not diluted below 50 per cent. How much should be the value of shares to the finance company so that it could earn 25 per cent rate of return?

The finance company invests Rs 90 lakh, and its cash inflows are interest received, repayments of principal and the value of shares in Hindustan Chemical in the year 2009. Its return would be 25 per cent if the present value of its investment at 25 per cent were equal to the present value of its inflows (i.e., NPV = 0).

$$NPV = PV \text{ of interest} + PV \text{ of repayment} + PV \text{ of shares} - \text{Investment} = 0$$

NOTES

We know that the finance company is expected to receive Rs 9 lakh interest per year for eight years and Rs 6 lakh and Rs 3 lakh in ninth and tenth years. Also, it would get Rs 30 lakh each in the last three years. Using the present value table given at the end of the book, we can calculate the present value of interest and repayment of principal. NPV at 25 per cent discount rate is as follows:

$$NPV = 31.1 + 12.2 + 0.328 \times \text{Value of shares} - 90.0 = 0$$

$$\text{Value of shares} = 46.7/0.328 = \text{Rs } 142.4 \text{ lakh}$$

How much is the value of Hindustan Chemicals shares expected after five years? It is a growing company. Therefore, it would not be unreasonable to assume a price-earnings ratio of 15 after five years. The value of the company's shares in 2009 could be expected as: Rs 33.5 × 15 = Rs 502.5 lakh. Thus, the company should be prepared to give about 28 per cent ownership (142.4/502.5) to the finance company. If the price-earnings is expected to be low, say 10, Hindustan Chemical may have to sacrifice about 43 per cent of its ownership.

Illustration 11.4 shows that Hindustan Chemical was a highly successful company. It has a much brighter future because of its high potential to grow at a much higher rate, save costs and improve its profit margin. It is being considered to be bought out by its managers. Since they have so well managed the company in the past, the lender has confidence in them and is prepared to provide a high leverage. Lender is also expecting a high return. Therefore, he would have to be given '**equity sweetener**' by the buyer. He would lend funds to the manager-buyers of Hindustan chemicals at concessional rate of interest but he would also like to have a stake in the company's equity. He is expecting a return of 25 per cent. The manager-buyers should estimate the value of the company after five years when the lender may like to use his option to buy the company's shares and accordingly decide how much ownership they should be prepared to share with the lender. They should use the discounted cash flow approach, as shown in the illustration, for this purpose.

11.13.4 Divestment

A **divestment** involves the sale of a company's assets, or product lines, or divisions or brand to the outsiders. It is reverse of acquisition. Companies use divestment as a means of restructuring and consolidating their businesses for creating more value for shareholders. In divestment, the selling company intends to create more value for shareholders. It sells the part of business for a higher price than its current worth. The remaining business might also find it true value. Thus, divestment creates reverse synergy.

The following are some of the common motives for divestment:

- ***Strategic change*** Due to the economic and competitive changes, a company may change its product-market strategy. It might like to concentrate its energy to certain types of businesses where it has competencies and competitive advantage. Hence it may sell businesses that more fit with the new strategy.

Table 11.20: Hindustan Chemical: Estimation of Cash Flows

(***Rs in lakh***)

	2005	***2006***	***2007***	***2008***	***2009***	***2010***	***2011***	***2012***	***2013***	***2014***
Net sales	124.7	155.9	194.8	243.6	304.6	380.6	475.7	594.7	743.4	929.2
EBIT	31.2	39.0	48.7	60.9	76.1	95.2	118.9	148.7	185.8	232.3
Interest	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	6.0	3.0
PBT	22.2	30.0	39.7	51.9	67.1	86.2	109.9	139.7	179.8	229.3
Tax	11.1	15.0	19.9	26.0	33.6	43.1	55.0	69.9	90.0	114.7
PAT	11.1	15.0	19.8	25.9	33.5	43.1	54.9	69.8	89.9	114.6
Plus: Depreciation	1.6	1.7	1.8	1.9	2.1	2.5	2.9	3.6	4.4	5.4
CFO	12.7	16.7	21.6	27.8	35.6	45.6	57.8	73.4	94.3	120.0
Less: Change in NWC	5.3	7.5	9.4	11.8	14.5	18.2	22.9	28.6	35.7	44.6
Less: Change CAPEX	0.8	0.8	1.0	1.3	2.1	3.5	4.6	6.2	8.0	10.2
NCF	6.6	8.4	11.2	14.7	19.0	23.9	30.3	38.6	50.6	65.2
Repayment								30.0	30.0	30.0
Cash flow available to owners	6.6	8.4	11.2	14.7	19.0	23.9	30.3	8.6	20.6	35.2

- ***Selling cash cows*** Some of the company's businesses might have reached saturation. The company might sell these businesses which are now 'cash cows'. It might realise high cash flows that it can invest in 'stars' that have high growth potential in the future.
- ***Disposal of unprofitable businesses*** Unprofitable businesses are a drain on the company's resources. The company would be better of discarding such businesses.
- ***Consolidation*** A company might have become highly diversified due to unplanned acquisitions in the past. It might sell its unrelated businesses, and consolidate its remaining businesses as a balanced portfolio.
- ***Unlocking value*** Sometimes stock market is not able to value a diversified company properly since it does not have full disclosure of information for the businesses separately. Once the businesses are separated, the stock market correct values the businesses.

11.13.5 Sell-off

There are two types of divestment: sell-off and spin-off . When a company sells part of its business to a third party, it is called sell-off. It is a usual practice of a large number of companies to sell-off is to divest unprofitable or less profitable businesses to avoid further drain on its resources. Sometimes the company might sell its profitable, but non-core businesses to ease its liquidity problems.

11.13.6 Spin-offs

When a company creates a new from the existing single entity, it is called spin-off. The spin-off company would usually be created as a subsidiary. Hence, there is no change in ownership. After the spin-off, shareholders hold shares in two differentcompanies.

Spin-off may have the following advantages:

1. When the businesses are legally and physically separated, shareholders would have information about separate businesses. They would be able to value separate businesses more easily. Management would now know which business is a poor-performing business. Quick managerial action could be initiated to improve the performance.
2. There may be improvement in the operating efficiency of the separate businesses as they would receive concentrated attention of the respective managements.
3. Spin-offs could reduce the attractiveness for acquisition when the new company is clearly an under performer. As a part of a single entry, it might be obvious that the business unit is an under-performer.
4. Spin-off (and sell-off as well) makes it possible for companies to allocate their resources to growth opportunities that have the potential of creating high values for shareholders in the future.

11.14 REGULATIONS OF MERGERS AND TAKEOVERS IN INDIA

Mergers and acquisitions may degenerate into the exploitation of shareholders, particularly minority shareholders. They may also stifle competition and encourage monopoly and monopolistic corporate behaviour. Therefore, most countries have legal framework to regulate the merger and acquisition activities. In India, mergers and acquisitions are regulated through the provision of the Companies Act, 1956, the Monopolies and Restrictive Trade Practice (MRTP) Act, 1969, the Foreign Exchange Regulation Act (FERA), 1973, the Income Tax Act, 1961, and the Securities and Controls (Regulations) Act, 1956.[19] The Securities and Exchange Board of India (SEBI) has issued guidelines to regulate mergers, acquisitions and takeovers.

Check Your Progress

21. What is a leveraged buy-out? Why is a leveraged buy-out a high-risk high-return way of approaching acquisitions?
22. Distinguish between a sell-off and a spin-off.

19. Bhattacharyya, *op. cit.*

NOTES

11.14.1 Legal Measures against Takeovers

The Companies Act restricts an individual or a company or a group of individuals from acquiring shares, together with the shares held earlier, in a public company to 25 per cent of the total paid-up capital. Also, the Central Government needs to be intimated whenever such holding exceeds 10 per cent of the subscribed capital. The Companies Act also provides for the approval of shareholders and the Central Government when a company, by itself or in association of an individual or individuals purchases shares of another company in excess of its specified limit. The approval of the Central Government is necessary if such investment exceeds 10 per cent of the subscribed capital of another company. These are precautionary measures against the takeover of public limited companies.

11.14.2 Refusal to Register the Transfer of Shares

In order to defuse situation of hostile takeover attempts, companies have been given power to refuse to register the transfer of shares. If this is done, a company must inform the transferee and the transferor within 60 days. A refusal to register transfer is permitted if:

- a legal requirement relating to the transfer of shares have not be complied with; or
- the transfer is in contravention of the law; or
- the transfer is prohibited by a court order; or
- the transfer is not in the interests of the company and the public.

11.14.3 Protection of Minority Shareholders' Interests

In a takeover bid, the interests of all shareholders should be protected without a prejudice to genuine takeovers. It would be unfair if the same high price is not offered to all the shareholders of prospective acquired company. The large shareholders (including financial institutions, banks and individuals) may get most of the benefits because of their accessibility to the brokers and the takeover dealmakers. Before the small shareholders know about the proposal, it may be too late for them. The Companies Act provides that a purchaser can force the minority shareholder to sell their shares if:

- the offer has been made to the shareholders of the company;
- the offer has been approved by at least 90 per cent of the shareholders of the company whose transfer is involved, within 4 months of making the offer; and
- the minority shareholders have been intimated within 2 months from the expiry of 4 months referred above.

If the purchaser is already in possession of more than 90 per cent of the aggregate value of all the shares of the company, the transfer of the shares of minority shareholders is possible if:

- the purchaser offers the same terms to all shareholders and
- the tenders who approve the transfer, besides holding at least 90 per cent of the value of shares, should also form at least 75 per cent of the total holders of shares.

11.14.4 SEBI Guidelines for Takeovers

The salient features of some of the important guidelines as follows:[20]

Disclosure of share acquisition/holding Any person who acquires 5% or 10% or 14% shares or voting rights of the target company, should disclose of his holdings at every stage to the target company and the Stock Exchanges within 2 days of acquisition or receipt of intimation of allotment of shares.

20. Based on the Securities and Exchange Board of India (Substantial Acquisition of Shares and Takeovers) Regulation, 1977. *New Takeover Code*, The Report of the Committee Appointed by SEBI on Takeover under the chairmanship of Justice P.N. Bhagwati was the basis of SEBI guidelines for takeovers.

NOTES

Any person who holds more than 15% but less than 75% shares or voting rights of target company, and who purchases or sells shares aggregating to 2% or more shall within 2 days disclose such purchase or sale along with the aggregate of his shareholding to the target company and the Stock Exchanges.

Any person who holds more than 15% shares or voting rights of target company and a promoter and person having control over the target company, shall within 21 days from the financial year ending March 31 as well as the record date fixed for the purpose of dividend declaration, disclose every year his aggregate shareholding to the target company.

Public announcement and open offer An acquirer who intends to acquire shares which along with his existing shareholding would entitle him to exercise 15% or more voting rights, can acquire such additional shares only after making a public announcement to acquire at least additional 20% of the voting capital of target company from the shareholders through an open offer.

An acquirer who holds 15% or more but less than 75% of shares or voting rights of a target company, can acquire such additional shares as would entitle him to exercise more than 5% of the voting rights in any financial year ending March 31 only after making a public announcement to acquire at least additional 20% shares of target company from the shareholders through an open offer.

An acquirer, who holds 75% shares or voting rights of a target company, can acquire further shares or voting rights only after making a public announcement to acquire at least additional 20% shares of target company from the shareholders through an open offer.

Offer price The acquirer is required to ensure that all the relevant parameters are taken into consideration while determining the offer price and that justification for the same is disclosed in the letter of offer. The relevant parameters are:

- negotiated price under the agreement which triggered the open offer.
- price paid by the acquirer for acquisition, if any, including by way of allotment in a public or rights or preferential issue during the twenty six week period prior to the date of public announcement, whichever is higher;
- the average of the weekly high and low of the closing prices of the shares of the target company as quoted on the stock exchange where the shares of the company are most frequently traded during the twenty six weeks or the average of the daily high and low prices of the shares as quoted on the stock exchange where the shares of the company are most frequently traded during the two weeks preceding the date of public announcement, whichever is higher.

In case the shares of Target Company are not frequently traded then parameters based on the fundamentals of the company such as return on net worth of the company, book value per share, EPS etc. are required to be considered and disclosed.

Disclosure The offer should disclose the detailed terms of the offer, identity of the offerer, details of the offerer's existing holdings in the offeree company etc. and the information should be made available to all the shareholders at the same time and in the same manner.

Offer document The offer document should contain the offer's financial information, its intention to continue the offeree company's business and to make major change and long-term commercial justification for the offer.

The objectives of the Companies Act and the guidelines for takeover are to ensure full disclosure about the mergers and takeovers and to protect the interests of the shareholders, particularly the small shareholders. The main thrust is that public authorities should be notified within two days.

In a nutshell, an individual or company can continue to purchase the shares without making an offer to other shareholders until the shareholding exceeds 10 per cent. Once the offer is made to other shareholders, the offer price should not be less than the weekly average price in the past 6 months or the negotiated price.

NOTES

11.14.5 Legal Procedures

The following is the summary of legal procedures for merger or acquisition laid down in the Companies Act, 1956:

- ***Permission for merger*** Two or more companies can amalgamate only when amalgamation is permitted under their memorandum of association. Also, the acquiring company should have the permission in its object clause to carry on the business of the acquired company. In the absence of these provisions in the memorandum of association, it is necessary to seek the permission of the shareholders, board of directors and the Company Law Board before affecting the merger.
- ***Information to the stock exchange*** The acquiring and the acquired companies should inform the stock exchanges where they are listed about the merger.
- ***Approval of board of directors*** The boards of the directors of the individual companies should approve the draft proposal for amalgamation and authorize the managements of companies to further pursue the proposal.
- ***Application in the High Court*** An application for approving the draft amalgamation proposal duly approved by the boards of directors of the individual companies should be made to the High Court. The High Court would convene a meeting of the shareholders and creditors to approve the amalgamation proposal. The notice of meeting should be sent to them at least 21 days in advance.
- ***Shareholders' and creditors' meetings*** The individual companies should hold separate meetings of their shareholders and creditors for approving the amalgamation scheme. At least, 75 per cent of shareholders and creditors in separate meeting, voting in person or by proxy, must accord their approval to the scheme.
- ***Sanction by the High Court*** After the approval of shareholders and creditors, on the petitions of the companies, the High Court will pass order sanctioning the amalgamation scheme after it is satisfied that the scheme is fair and reasonable. If it deems so, it can modify the scheme. The date of the court's hearing will be published in two newspapers, and also, the Regional Director of the Company Law Board will be intimated.
- ***Filing of the Court order*** After the Court order, its certified true copies will be filed with the Registrar of Companies.
- ***Transfer of assets and liabilities*** The assets and liabilities of the acquired company will be transferred to the acquiring company in accordance with the approved scheme, with effect from the specified date.
- ***Payment by cash or securities*** As per the proposal, the acquiring company will exchange shares and debentures and/or pay cash for the shares and debentures of the acquired company. These securities will be listed on the stock exchange.

11.15 LET US SUMMARIZE

- ❖ A merger is the combination of two or more firms into one of the firms. Merger could be horizontal, vertical or conglomerate.
- ❖ Horizontal merger is the combination of two or more firms in the same stage of production/ distribution/area of business.
- ❖ Vertical integration is combination of two or more firms involved in different stages of production or distribution.
- ❖ Conglomerate merger is the combination of firms engaged in unrelated lines of business. Acquisition or takeover means a combination in which the acquiring company acquires all or part of assets (shares) of the target company. In acquisition, there exists willingness of the management of the target company to be acquired while this may not be so under takeover.

Check Your Progress

23. What is an open offer in the case of an acquisition?
24. Which are the major permissions required for a merger in India?

- A merger results into an economic advantage when the combined firms are worth more together than as separate entities. Merger benefits may result from economies of scale, economies of vertical integration, increased efficiency, tax shields or shared resources.
- Merger should be undertaken when the acquiring company's gain exceeds the cost. Cost is the premium that the buyer (acquiring company) pays for the selling company (target company) over its value as a separate entity.
- Discounted cash flow technique can be used to determine the value of the target company to the acquiring company. However, the mechanics of buying a company is very complex than those of buying an equipment or machine. Integrating an acquired company successfully to the buying company's operation is quite difficult and challenging task.
- The assets and liabilities of the post-merger firm can be combined later using either the pooling of interest method or the purchase method. In the pooling of interest method, assets and liabilities are combined at book values. In the purchase method, the assets and liabilities are revalued and then combined. The difference between book values of assets and liabilities and their revaluation is shown as goodwill or capital reserve.
- In a leveraged buy-out (LBO), a company is bought by raising most funds through borrowings. When the company is bought-out by its own managers, it is called management buy-out (MBO). After acquisition, the LBO generates lot of profits and creates high value. Lenders get high return by converting their loans into equity or using warrants buying the company's shares.
- Companies undertake corporate restructuring to enhance the shareholder value. Corporate restructuring make take the forms of ownership restructuring, business restructuring and assets restructuring. Mergers and acquisitions and leveraged buy-outs results in change in ownership. Divestment of a business unit is an example of business restructuring. Sale of asset amounts to asset restructuring.
- A business restructuring may take place through sale-off or spin-off. Sale-off involves transfer of the business or asset to an outside part. Spin-off usually takes the form of a subsidiary company and does amount to change in shareholding. Shareholders of the erstwhile entity hold shares of the separate companies.
- Merger and acquisition activities are regulated under various laws in India. The objectives of the laws as well as the stock exchange requirements are to make merger deals transparent and protect the interest of all shareholders.

11.16 KEY CONCEPTS

Absorption
Acquisition
Agency costs
Backward integration
Boot-strapping
Combination
Conglomerate merger
Consolidation
Crown jewels
Debt capacity
Divestiture
Forward integration
Golden parachutes
Greenmail
Holding company
Horizontal merger
Hostile acquisition
Leveraged buy-out
Management buy-out
Merger
Non-systematic risk
Poison pills
Pooling of interest
Purchase method
Share exchange ratio
Synergy
Systematic risk
Takeover
Tender offer
Vertical merger
White knight

11.17 ILLUSTRATIVE SOLVED PROBLEMS

Problem 11.1: Gama Fertilisers Company is taking over Theta Petrochemical Company. The shareholders of Theta would receive 0.8 shares of Gama for each shares held by them. The merger is not expected to yield in economies of scale and operating synergy. The relevant data for the two companies are as follows:

NOTES

	Gama	*Theta*
Net sales (Rs in crore)	335.00	118.00
Profit after-tax (Rs in crore)	58.00	12.00
Number of share (crore)	12.00	3.00
Earnings per share (Rs)	4.83	4.00
Market value per share (Rs)	30.00	20.00
Price-earnings ratio	6.21	5.00

For the combined company (after merger), you are required to calculate (*a*) EPS, (*b*) P/E ratio, (*c*) market value per share, (*d*) number of shares, and (*e*) total market capitalisation. Also calculate the premium paid by Gama to the shareholders of Theta.

Solution

Premium paid to Theta's shareholders:

Value of each share in Gama: 0.8 × Rs 30 = Rs 24

Value of Theta's share before merger = Rs 20

Premium = Rs 4

Premium percentage = 4/20 = 20 per cent

Number of shares paid to Theta's shareholders: 3 × 0.8 = 2.4 crore

Number of shares of the combined company: 12 + 2.4 = 14.4 crore

Combined profit after tax: Rs 58 + Rs 12 = Rs 70 crore

Combined EPS = 70/14.4 = Rs 4.86

Combined price-earnings ratio:

6.21 × (58/70) + 5 × (12/70) = 6.00

Combined firm's market capitalization:

Market value per share = P/E ratio × EPS = 6.00 × 4.86 = Rs 29.16

Capitalisation: MVPS × No. of shares = Rs 29.16 × 14.4 = Rs 419.9 crore

Problem 11.2: Pee Company has decided to acquire Kay company. The following are the relevant financial data for the two companies:

	Pee Co.	*Kay Co.*
Net sales (Rs in lakh)	350.00	45.00
Profit after-tax (Rs in lakh)	28.13	3.75
Number of shares (lakh)	7.50	1.50
Earnings per share (Rs)	3.75	2.5
Dividend per share (Rs)	1.30	0.60
Total market capitalisation (Rs in lakh)	420.00	45.00

Calculate: (*a*) pre-merger market value per share for both companies, (*b*) post-merger EPS, market value per share and price-earnings ratio if Kay's shareholders are offered a share of (*i*) Rs 30, or (*ii*) Rs 56, or (*iii*) Rs 20 in a share exchange for merger, (*c*) Pee's EPS if Kay's shareholders are offered Rs 100, 15 per cent convertible debenture for each 3 shares held in Kay, and (*d*) post-merger dividend or interest available to Kay's shareholders with exchanges referred in (*b*) and (*c*) Assume 50 per cent tax rate.

Solution

(*a*) Pre-merger market value per share = $\frac{\text{Market capitalisation}}{\text{Number of shares}}$

Pee: 420/7.50 = Rs 56; Kay: 45/1.50 = Rs 30

(*b*) Share exchange ratio:

(*i*) 30/56 = 0.536 (*ii*) 56/56 = 1 (*iii*) 20/56 = 0.357

Number of shares of the surviving company:

(*i*) 7.5 + (0.536 × 1.5) = 8.30 (*ii*) 7.5 + (1 × 1.5) = 9.00 (*iii*) 7.5 + (0.357 × 1.5) = 8.04

Combined EPS: Combined PAT/Combined number of shares

(*i*) (28.13 + 3.75)/8.30 = Rs 3.84 (*ii*) (28.13 + 3.75)/9.00 = Rs 3.5 (*iii*) (28.13 + 3.75/8.04 = Rs 3.97

Combined firm's P/E ratio = weighted average of the individual firm's pre-merger P/E ratio

{(420/28.13) × {(28.13/(28.13 + 3.75)} + {(45/3.75) × {3.75/(28.13 + 13.75)}

= 14.93× 0.882 + 12 × 0.118 = 14.58

Market value per share of the surviving firm:

(*i*) (3.84× 14.58) = Rs 56 (*ii*) (3.54 ×14.58) = Rs 51.61 (*iii*) (3.97 × 14.58) = Rs 57.88

(*c*) Number of convertible debentures; 1.50/3 = 0.50 lakh

Interest on debenture 1.50 × Rs 100 × 15% = Rs 7.5 lakh

Combined profit after-tax = 28.13 + 3.75 – 7.5 + 0.5 × 7.5

Pee's EPS after merger = 28.13/7.50 = Rs 3.75

Note: Interest will be deducted from the combined profit but is will save tax at 50 per cent tax rate.

(*d*) Dividend to Kay's shareholders after merger:

Exchange of shares:

(*i*) 0.804 × 1.30 = Rs 1.05 lakh (*ii*) 1.50 × 1.30 = Rs 1.95 lakh (*iii*) 0.536 × 1.30 = Rs 0.70 lakh

Interest 0.50 × 100 × 0.15 = Rs 7.50 lakh

Post-merger dividend: 1.50 × 0.6 = Rs 0.90 lakh.

Problem 11.3: Small Company is being acquired by Large Company on a share exchange basis. Their selected data are as follows:

	Large	***Small***
Profit after-tax (Rs in lakh)	56	21
Number of shares (lakh)	10	8.4
Earnings per share (Rs)	5.6	2.5
Price-earnings ratio	12.5	7.5

Determine (*a*) pre-merger, market value per share, and (*b*) the maximum exchange ratio Large Company should offer without the dilution of (*i*) EPS (*ii*) market value per share.

Solution

(*a*) Pre-merger market-value per share: P/E ratio × EPS

Large: 12.5 × 5.6 = Rs 70

Small: 7.5 × 2.5 = Rs 18.75

(*b*) (*i*) Maximum exchange ratio without dilution of EPS:

Pre-merger PAT of Large (Rs in lakh)	56
Pre-merger PAT of Small (Rs in lakh)	21
Combined PAT without Synergy (Rs in lakh)	77
Large's EPS	5.6
Maximum number of shares of Large after merger (77/5.6) (lakh)	13.75
Existing number of shares (lakh)	10.00
Maximum number of shares to be exchanged (lakh)	3.75
Maximum share exchange ratio: 3.75/8.4	0.446

NOTES

(*ii*) Maximum exchange ratio without dilution of market value per share:

Pre-merger market capitalisation of Large:	
MV × No. of shares = Rs 70 × 10 lakh	700
Pre-merger market capitalisation of Small:	
MV × No. of shares = Rs 18.75 × 8.4 lakh	157.5
Combined market capitalisation (Rs in lakh)	857.5
Current market value per share for Large shareholders (Rs)	70
Maximum number of shares of Large (surviving company) (857.5/70) (lakh)	12.25
Current number of shares of Large (lakh)	10.00
Maximum number of shares to be exchanged (lakh)	2.25
Maximum shares exchanged ratio: 2.25/8.4	0.268

Note: In a share exchange, there would not be a dilution of EPS if the acquiring company offers to pay a P/E ratio for the acquired firm's shares equal to its pre-merger P/E ratio. Large has a P/E ratio of 12.5 and the acquired firm's pre-merger EPS is Rs 2.5. Thus it could offer upto 12.5 × 2.5 = Rs 31.25 for Small's shares. The maximum exchange ratio is: 31.25/70 = 0.446.

Problem 11.4

XYZ Company is acquiring *PQR* Company. *XYZ* will pay 0.5 of it shares to the shareholders of *PQR* for each share held by them. The data for the two companies are as given below:

	XYZ	***PQR***
Profit after-tax (Rs in lakh)	150	30
Number of shares (lakh)	25	8
Earnings per share (Rs)	6.00	3.75
Market price of share (Rs)	78.00	33.75
Price-earnings ratio	13	9

Calculate the earnings per share of the surviving firm after merger. If the price-earnings ratio falls to 12 after the merger, what is the premium received by the shareholders of *PQR* (using the surviving firm's new price)? Is the merger beneficial for *XYZ*'s shareholders?

Solution:

Combined profit after-tax = 150 + 30 = Rs 180 lakh

Combined shares = 25 + 0.5(8) = 29 lakh

EPS = 180/29 = Rs 6.21

Market price after merger = P/E × EPS = 12 × 6.21 = Rs 74.52

Premium = {0.5 (74.52) – 33.75}/33.75

= (37.26 – 33.75)/33.75 = 0.104 or 10.4%

The merger is not beneficial to *XYZ*'s shareholders because their price falls from Rs 78 to Rs 74.52—a loss of 4.5 per cent.

Problem 11.5

The chief executive of a company thinks that shareholders always look for the earnings per share. Therefore, he considers maximisation of the earnings per share as his company's objective. His company's current net profits are Rs 80 lakh and EPS is Rs 4. The current market price is Rs 42. He wants to buy another firm which has current income of Rs 15.75 lakh, EPS of Rs 10.50 and the market price per share of Rs 85.

What is the maximum exchange ratio which the chief executive should offer so that he could keep EPS at the current level? If the chief executive borrows funds at 15 per cent rate of interest and

buys-out another company by paying cash, how much should he offer to maintain his EPS? Assume a tax rate to 52 per cent.

Solution

(*a*) Combined net profit/No. of shares = 4.00

$(80 + 15.75)/(20 + x) = 4$

$80 + 15.75 = 80 + 4x$

$x = 3.9375$ lakh

Thus the share exchange ratio is 3.9375/1.5 = 2.625

Note: Number of shares = PAT/EPS

(*b*) Combined net profit/No. of shares = 4.00

$\{80 + 15.75 - 0.15 (\text{Debt}) (1 - 0.52)\}/20 = 4.00$

$(95.75 - 0.072 \text{ Debt})/20 = 4$

Debt = 0.7875/0.0036 = Rs 218.75 lakh

The chief executive should offer Rs 218.75/1.5 = Rs 145.83 cash per share.

Problem 11.6: Rama International is investigating the acquisition of Shivani International Company. Shivani's balance sheet is given below:

Table 11.21: Shivani International Company: Balance Sheet

(Rs in crore)

10% cumulative preference capital		100
Ordinary share capital (30 crore shares at Rs 10 per share)		300
Reserves and surplus		150
14% Debentures		80
Current liabilities		100
Total		730
Net fixed assets		275
Investments		50
Current Assets:		
Stock	190	
Book debts	150	
Cash and bank balance	65	405
Total		730

Rama proposed to offer the following to Shivani:

(*a*) 10% convertible preference shares of Rs 100 crore in Rama for paying 10% cumulative preference capital of Shivani;

(*b*) 12% convertible debentures of Rs 84 crore in Rama to redeem 14% debentures of Shivani;

(*c*) One ordinary share of Rama for every three shares held by Shivani's shareholders, the market price per share being Rs 42 for Rama's shares and Rs 20 for Shivani's shares.

After acquisition, Rama is expected to dispose off Shivani's stock (inventory) for Rs 150 crore, book debts for Rs 102 crore and investments for Rs 55 crore. It would pay entire current liabilities. What is the cost of acquisition to Rama? If Rama's required rate of return is 20 per cent, how much should be the annual after-tax cash flows from Shivani's acquisition assuming a time horizon of eight years and a zero salvage value? Would your answer change if there is a salvage value of Rs 30 crore after 8 years?

NOTES

Solution

(*a*) Cost of acquisition

(Rs in crore)

10% convertible preference share		100
12% convertible debentures		84
Ordinary share capital: (30/3) × Rs 42		420
Payment of current liabilities		100
Gross payment		704
Less: Realisation from:		
Investments	55	
Stock	150	
Book debts	102	
Cash	65	372
Net Cost		332

(*b*) (*i*) $332 = A \times \text{PVAF}_{0.20, 8}$

$332 = A \times 3.837$

$A = 332/3.837 = \text{Rs } 86.53 \text{ crore}$

(*ii*) $332 = A \times \text{PVAF}_{0.20, 8} + 30\ \text{PVF}_{0.20, 8}$

$332 = 3.837A + 0.233 \times 30$

$332 = 3.837A + 6.99$

$A = (332 - 6.99)/3.837 = \text{Rs } 84.70 \text{ crore.}$

11.18 ANSWERS TO 'CHECK YOUR PROGRESS'

1. Corporate restructuring involves ownership restructuring, business restructuring and asset restructuring. A company may effect ownership restructuring through various methods including mergers and acquisitions, buyback of shares, leveraged buyouts, joint ventures, spin-offs and strategic alliances. Business restructuring implies reorganisation of business units and includes diversification into new businesses, divestment, outsourcing and brand acquisitions. Asset restructuring includes sale and leaseback of assets, securitisation of debt, receivables factoring, etc.
2. Corporate restructuring refers to the changes in ownership, business mix, assets mix and alliances with a view to enhance the shareholder value. The basic purpose of corporate restructuring is to enhance/increase the shareholder value. Corporate restructuring includes mergers, acquisitions, leveraged buyouts and divestments.
3. A merger occurs when two or more companies combine into one company. One or more companies may merge with an existing company (absorption) or they may merge to form a new company (consolidation). In India mergers are known as amalgamations. On the other hand, acquisition may be defined as the act of acquiring effective control over assets and management of a company by another company without any combination of businesses or companies. Sometimes instead of acquisition, the word takeover is used. Sometimes, takeover is used when the acquisition is hostile.
4. Major types of mergers are horizontal mergers, vertical mergers and conglomerate mergers. A horizontal merger is a combination of two or more firms in similar type of production, distribution or area of business. On the other hand, a vertical merger is one where two or more firms are involved in different stages of production or distribution. Finally, conglomerate merger is one in which there is a combination of firms involved in unrelated business activities.

NOTES

5. Horizontal Merger refers to the combination of two or more firms in similar type of production. Vertical Merger refers to the combination of two or more firms in involved in different stages of production or distribution. Conglomerate merger refers to the combination of two or more firms engaged in unrelated lines of business activity.

6. With increased business activity as well as competition, M&A activity has been increasing in India in recent years. Companies are growing their businesses in their core areas while divesting their businesses in their non-core areas. Foreign companies are increasingly coming into India, and sometimes they are acquiring businesses to grow in India rather than start greenfield projects.

7. Economies of scale, operating economies and synergy may lead to improved profitability. Economies of scale arise when increase in the production volume leads to a reduction in the cost of production per unit. In addition to the economies of scale, a combination of two or more firms may result in cost reduction due to operating economies. For example, in the case of vertical mergers (both backward and forward), such improvement of operating economies is common. Synergy implies a situation wherein the combined firm is more valuable than the sum of the individual combining firms. Synergy may arise from operating economies as well as enhanced managerial capabilities, innovativeness, improved R&D and market coverage.

8. One of the strategies adopted by a company to grow is to acquire companies/ businesses rather than starting new businesses. A cash rich company may also acquire companies with the surplus cash. Sometimes, a merger of two companies, with fluctuating, but negatively correlated cash flows can bring stability of cash flows of the combined company. If the merged entity is able to generate stable cash flows and thus reduce the risk of insolvency, the merged entity may be able to borrow at lower rates.

9. The various underlying financial benefits in case of merger are

   (a) Eliminating the financial constraint

   (b) Deploying surplus cash

   (c) Enhancing debt capacity

   (d) Lowering of financing costs of the organization

10. A merger will make economic sense to the shareholders when the combined present value of the merged firms is greater than the sum of their individual present values as separate entities. The economic advantage arises on account of operating efficiencies and synergy. In practice, the number of shares to be exchanged on merger may be based on the current market value of the acquiring firm.

11. In order to apply the DCF technique, cash flows from the target company will have to be estimated. Information is also required on the appropriate discount rate. The appropriate discount rate will depend on the risk of the expected cash flows of the target.

12. Relevant cash flows include revenues and expenses, capital expenditure and depreciation and working capital changes. Finally, the terminal value of the firm is important.

13. There are various ways of financing a merger including cash, shares and debt. A cash offer is basically a straightforward means of financing a merger. In this method, there is no dilution in the earning per share and the ownership of the existing shareholders of the acquiring company. The shareholders of the merging company receive cash for selling the shares to the acquiring company. In the case of a share exchange, the ownership pattern of the existing shareholders and new shareholders (erstwhile shareholders of the acquired company) changes. The net benefits that accrue to each group would depend on the exchange ratio in terms of the market prices of the shares of the acquiring company and the acquired company.

14. Theoretically, the exchange ratio between the share price of the acquired firm and the share price of the acquiring firm should keep the position of the shareholders in value terms unchanged after the merger since their proportionate wealth would remain at the pre-merger level. However, in such a scenario, there would be no incentive for the shareholders of the

NOTES

acquired firm to sell out, and they would therefore require a premium to be paid by the acquiring company. If the acquiring company pays a premium and still be better off in terms of additional value to its shareholders, there should be sufficient net economic gain. A merger should be undertaken only when the acquiring company's gain exceeds the cost, which is the premium paid by the buying company to the selling company. A merger would result into an economic advantage when the combined firms are worth more together than as separate entities. Such benefits could arise from economies of scale, integration benefits, increased efficiency, tax shields, etc.

15. A tender offer is a formal offer to purchase a given number of a company's shares at a specified price. The price is usually quoted at a premium in order to induce the shareholders of the target company to tender their shares. In the normal course, the acquiring company approaches the management of the target company with a takeover proposal. If the target company management does not agree, then the shareholders may be approached directly. If no negotiations are held or the negotiations with the management of the target company fail, the offer to the shareholders of the target company is called a hostile takeover.

16. The management of the target company may take several steps to defend itself from a hostile takeover. A company may 'divest' or spin off some of its lucrative businesses to an independent company. A target company is said to use a 'white knight' when its management approaches a friendly company to escape from a hostile takeover. This may be done so that the present management of the company can continue. A 'poison pill' is a method used by a company to make itself unattractive to potential bidders. One method could be to issue substantial amount of convertible debentures to its existing shareholders to be converted at a future date. This makes the task of the bidder more difficult as the number of shares required to have voting control of the company will increase substantially.

17. Defensive tactics refers to the various tactics adopted by a target company for to defend itself from hostile takeover through a tender offer. These tactics include a divestiture or spin-off, poison pill, greenmail, white knight, golden parachutes etc

18. A tender offer is a formal offer to purchase a given number of a company's shares as a specific price. The acquiring company asks the shareholders of the target company

19. Some of the reasons for failure of a merger or acquisition would include lack of research by the management of the acquiring company, faulty evaluation, excessive premium and failure to manage post-merger integration. Failure may result from lack of sufficient planning at the initial stage, overestimating the benefits of a merger and finally being unable to handle organisational and cultural issues post-merger.

20. For mergers or amalgamations, the accounting method used is the 'pooling of interests method' of accounting. Under this method, the assets, liabilities and other balance sheet items as well as profit and loss items of the merged firms are simply added at the book values without making any adjustments. Thus, there is no revaluation or creation of goodwill. On the other hand, the 'purchase method' of accounting is used when acquisition is involved. Under this method, the assets and liabilities after acquisition are generally revalued. If the acquirer has paid a price greater than the fair market value of assets and liabilities, the excess amount is shown as goodwill in the acquiring company's books. However, if the fair value of assets and liabilities is greater than the purchase price paid, then this difference is shown as capital reserve.

21. A leveraged buy-out (LBO) is an acquisition of a company which has been financed mainly through debt. When the managers buy their company from its owners employing debt, the LBO is called a management buy-out. Companies with high growth potential are usually targets for LBOs. This is a high risk strategy. However, both the buyer and the lender are prepared to assume high risks in a leveraged buy-out because they have full confidence in the abilities of the managers to fully utilise the potential of the business and covert it into very high value.

22. Both sell-offs and spin-offs are forms of divestment. In the case of a sell-off, a company sells part of its business to a third party. In contrast, when a company creates a new entity from

the existing company, then it is known as a spin-off. In the case of a spin-off, there is no change in ownership. Spin-offs are sometimes used to improve operating efficiency as a separate business may receive more attention from the management.

23. As per guidelines issued by the Securities and Exchange Board of India (SEBI), an acquirer who intends to acquire shares which along with his existing shareholding would entitle him to exercise 15% or more voting rights, the acquirer can acquire such additional shares only after making a public announcement to acquire at least additional 20% of the voting capital of the target company from the shareholders through an open offer.

24. Mergers are regulated through a number of legal provisions in the Companies Act, Income Tax Act, Securities and Controls (Regulations) Act, etc. However, the main regulator in this area now is SEBI, the capital market regulator. SEBI has issued guidelines to regulate mergers, acquisitions and takeovers. In the case of mergers, first the board of directors of the respective companies have to approve the merger proposal. An application for approving the draft amalgamation proposal, duly approved by the boards of directors of the individual companies, is then made to the High Court. The High Court would convene a meeting of the shareholders and creditors to approve the amalgamation proposal. The individual companies should hold separate meetings of their shareholders and creditors for approving the amalgamation scheme. At least 75 per cent of the shareholders and creditors in separate meetings, voting in person or by proxy, must accord their approval to the scheme. After the approval of shareholders and creditors, the High Court will pass order sanctioning the amalgamation scheme.

11.19 QUESTIONS AND EXERCISES

Review Questions

1. Define and distinguish between the concepts of merger, takeover and amalgamation. Illustrate your answer with suitable examples in the Indian context.
2. Explain the concepts of horizontal, vertical and conglomerate merger with examples.
3. What are the advantages and disadvantages of mergers and takeovers?
4. What are the important reasons for mergers and takeovers?
5. Discuss in brief the legislation applicable to mergers and takeovers in India. What are the objectives of such legislation?
6. Explain and illustrate the impact of mergers on earnings per share, market price per share and book value per share of the acquiring company.
7. When do mergers make economic sense? Explain.
8. What do you mean by "tender offer"? What tactics are used by a target company to defend itself from a hostile takeover?
9. What do you understand by leveraged buy-out and management buy-out? Explain the steps involved in the evaluation of LBO?
10. What leads to the failure of a merger or acquisition? How should a company ensure that merger or acquisition is successful?
11. What are the problems of post-merger integration? How can integration be achieved?
12. What is the difference between the pooling of interest and purchase methods of accounting for mergers? Illustrate your answer.

NOTES

Exercises

1. *X* Company Ltd. intends to take over *Y* Company Ltd. by offering two of its shares for every five shares in *Y* Company Ltd. Relevant financial data are as follows:

	X Co. Ltd.	*Y Co. Ltd.*
Earnings per share (Rs)	2	2
Market price per share (Rs)	100	40
Price-earnings ratio	50	20
Number of shares ('000)	100	250
Profit after tax (Rs '000)	200	500
Total market value (Rs '000)	10,000	10,000

What is the combined earnings per share? Calculate the P/E ratio of the combined firm. Has any wealth been created for shareholders?

2. Alpha Ltd. is considering the acquisition of Beta Ltd. By making an offer of shares at 5 times of Beta's present earnings. Alternatively, a reverse takeover is possible whereby Beta could offer to buy Alpha's shares at 20 times its present earnings. What are the implications of these proposals? The relevant data are as follows:

	Alpha	*Beta*
Earnings per share (Rs)	2	2
Market price per share (Rs)	40	20
Price-earnings ratio	20	10
Number of shares ('000)	400	400
Profit after tax (Rs '000)	800	800
Total market value (Rs '000)	16,000	8,000

Calculate the effect on EPS. Would your answer be different if there are merger benefits of Rs 200,000 and Rs 100,000 in the first proposal and second proposals, respectively?

3. Rama Company is considering the acquisition of Krishna Company with exchange of its shares. The financial data for the companies are as follows:

	Rama Co.	*Krishna Co.*
Profit after-tax (Rs '000)	800	600
No. of equity shares ('000)	200	300
Earnings per share (Rs)	4	2
Price-earnings ratio	15	10
Market price per share (Rs)	60	20

Krishna Company expects an offer of 125 per cent of its current market price from Rama Company.

(*a*) What is the exchange ratio of shares? How many new shares will be issued?

(*b*) What is the acquiring company's EPS after the merger? Assume 15 per cent synergy benefits accrue due to the merger.

(*c*) If the price/earnings ratio after merger is at 20 times, what is the market price per share of the surviving company?

4. The following data relate to Companies *A* and *B*:

	Company A	***Company B***
Profit after-tax (Rs '000)	100	20
Equity shares ('000)	50	5
Price-earnings ratio	20	10

(*a*) If *A* and *B* merge by exchanging one share of Company *A* for each share of Company *B*, how would earnings per share of the two companies be affected? What is the market value exchange ratio?

(*b*) If the exchange ratio were 3 shares of *A* for two shares of *B*, what would be the impact of earnings per share after merger. Assume that there would be synergy benefits equal to 20 per cent increase in the present earnings due to merger.

(*c*) What exchange ratio would you suggest for the above merger?

5. *X* Company wants to acquire *Y* Company. If the merger were effected through an exchange of shares, *X* Company would be willing to pay 40 per cent premium for *Y* Company's shares. The following data are pertinent to Companies *X* and *Y*:

	X Company	***Y Company***
Net Profit (Rs '000)	1000	200
Number of shares ('000)	500	250
Market price per share (Rs)	120	30

(*a*) Compute the combined earnings per share.

(*b*) What exchange ratio would you suggest?

(*c*) If the exchange ratio were 1 share of Company *X* for each share of Company *Y*, what would happen?

6. Sholapur Shoes Limited is evaluating the possibility of acquiring Kohalapur Shoes Limited. The following are data for the two companies:

	Sholapur	***Kohalapur***
Profit after-tax (Rs in lakh)	54.75	9.90
Earnings per shares (Rs)	7.30	2.20
Dividend per share (Rs)	4.20	1.20
Number of shares (lakh)	7.50	4.50
Total market capitalization (Rs in lakh)	1,000.00	135.00

(*a*) Calculate the price-earnings ratio of both the companies before merger.

(*b*) Kohalapur's earnings and dividends are expected to grow at 7.5 per cent without merger and at 10 per cent with merger. You are required to determine: (*i*) gain from the merger, (*ii*) the cost of merger if Kohalapur is paid cash of Rs 40 per share, and (*iii*) the cost of merger if the share exchange ratio is 0.25.

7. Varun Chemicals Limited is proposing a takeover of Siddharth Pharm Limited. Varun's main objective of the takeover is to increase its size as well as diversify its operations. Varun's after-tax profits in the recent past have grown at 18 per cent per year and of Siddharth at 15 per cent per year. Both companies pay dividends regularly. Varun retains about 70 per cent of its profits and Siddharth 50 per cent.

The summarised financial information for the two companies are given in the following.

NOTES

Summarised Profit and Loss Account **(*Rs in crore*)**

	Varun	*Siddharth*
Net sales	4545	3500
PBIT	1590	480
Interest	750	25
PBT	1440	455
Provision for tax	650	205
PAT	790	250
Dividends	235	125
Undistributed profit	555	125

Varun's share is currently selling for Rs 52 and Siddharth's Rs 75. The par value of both companies' share is Rs 10. Varun's land and building are stated at recent price. Siddharth's land and buildings were revalued three years ago. There has been 30 per cent per year increase in the value of land and building.

Summarised Balance Sheet ***(Rs in crore)***

	Varun		*Siddharth*	
Fixed Assets:				
Land and building, net	720		190	
Plant and machinery, net	900		350	
Furniture and fixtures, net	30	1650	10	550
Current Assets:				
Inventory	400		280	
Debtors	350		250	
Cash and bank balance	25	775	50	580
Less: Current Liabilities				
Creditors	230		130	
Overdrafts	35		10	
Provision for tax	145		50	
Provision for dividends	60	470	50	240
Net assets		1955		890
Paid up share capital	250		125	
Reserves and surplus	1050	1300	660	785
Borrowing		655		105
Capital employed		1955		890

Varun's management wants to determine the premium over the current market price of the shares which should be paid for the acquisition of Siddharth. Varun's financial analyst is considering two options. The price should be determined using: (*a*) the dividend-growth formula, or (*b*) the balance sheet net worth adjusted for the current value of land and buildings plus the estimated average after tax profits for the next five years. After merger, Siddharth's growth is expected to be 18 per cent each year.

8. Grewal Industries Ltd. is a diversified company with multiple businesses, and it also owns several subsidiary companies. Richa Foods Ltd. is one of its subsidiaries that sell packaged food items. Grewal is in the process of consolidating its businesses and therefore, it is changing its strategic focus. In light of its new strategic focus, it has decided to sell Richa Foods Ltd. A number of companies, some from the reputed business houses, have shown considerable interest in buying Richa Foods.

Table 11.22 and Table 11.23 contain the most recent Balance Sheet and Profit and Loss statement of Richa Foods Ltd.

Table 11.22: Balance Sheet as at 31 December, 2004

			Rs in crore
Buildings		930	
Less: Accumulated depreciation		155	775
Plant & Machinery		124	
Less: Accumulated depreciation		81	43
Furniture & Fixtures		39	
Less: Accumulated depreciation		8	31
			849
Current assets			
Stock at cost		132	
Debtors		85	
Cash at bank		78	
		295	
Less: Creditors			
Trade creditors	202		
Acquired expenses	54	256	39
Net assets			888
13% Long-term Loan			388
			500
Shareholders' Funds			
Ordinary share capital (Rs 10 share)			233
General reserve			54
Profit and Loss			213
			500

Table 11.23: Profit and Loss Account for the Year Ended 31 May, 1995

	(Rs in crore)
Sales turnover	1365
Profit before interest and taxation	135
Interest charges	47
Profit before taxation	88
Corporation tax	25
Profit after taxation	63
Dividend proposed and paid	16
Transfer to general reserve	12
Profit and Loss	35

Richa Foods' sales and profits have shown steady growth. The following are the possible realizable value of assets:

	(Rs in crore)
Buildings	911
Plant & machinery	31
Furniture & Fixtures	19
Stock	140

The book values of other assets are close approximation of their realisable value. A close competitor of Richa Foods has a price-earnings ratio of 12.5 and dividend yield of 5.4 per cent. The corporate income tax rate is 35 per cent.

Calculate the value of Richa Foods using alternative methods. Which method do you suggest as most appropriate? Why should Grewal Industries Ltd. sell its subsidiary?

UNIT 12 RETURN, RISK AND SHAREHOLDER VALUE

NOTES

Structure

12.0 INTRODUCTION

In finance theory, it is important to understand the concepts of risk and return. Further, it is important to understand the risk of a portfolio of securities. The Capital Asset Pricing Model (CAPM) is a model that provides a framework to determine the required rate of return or an asset and indicates the relationship between return and risk of the asset.

The theory of finance has undergone fundamental changes over the past three decades or so. Finance is no more a descriptive discipline; it is now viewed as a specialised branch of applied micro-economics, and the emphasis now is on the development of formal models, using sophisticated mathematical and econometrics tools. This approach seems to have created some gap between theory and practice. It is also felt that the finance theory is not complete and meaningful without its linkage with the strategic management. Therefore, there is a need for interdisciplinary interactions.

How can the finance theory and practice be used for designing of the corporate policies? How to establish a close link between the financial policies and strategic management? Strategy is an integrating mechanism, and that the corporate finance policy should be developed in the context

of the strategic decision-making framework. How can the financial policies and strategy be directed towards the shareholder value creation?

NOTES

12.1 UNIT OBJECTIVES

- Understand the concept of risk and return of an asset
- Understand portfolio theory of assets
- Discuss the Capital Asset Pricing Model (CAPM) and Arbitrage Pricing Theory (APT).
- Review the implications of financial theory for the corporate finance policies
- Emphasise the need for a linkage between the financial policies and strategic management
- Focus on the shareholder value creation
- Develop a framework for the shareholder value analysis
- Discuss the concept of economic value added (EVA) and market value added (MVA)

12.2 CAPITAL MARKET THEORY: AN OVERVIEW

Risk and return are most important concepts in finance. In fact, they are the foundation of the modern finance theory. What is risk? How is it measured? What is return? How is it measured? Other related questions are: how are assets valued in capital markets? How do investors make their investment decisions? We attempt to answer these questions in this unit.

12.2.1 Return on a Single Asset

India Cements is a large company with several thousand shareholders. Suppose you bought 100 shares of the company at the beginning of the year at a market price of Rs 225. The par value of each share is Rs 10. Your total investment is cash that you paid out. That is,

Investment: Rs 225 × 100 = Rs 22,500

Rupee returns Suppose during the year, India Cements paid a dividend at 25 per cent. As the dividend rate applies to the par value of the share, your dividend per share would be: Rs 10 × 25% = Rs 2.50, and total dividend would be:

Dividend = (Dividend rate × Par value) × Number of shares

Dividend = Dividend per share × Number of shares

Dividend = Rs 2.50 × 100 = Rs 250

Further, suppose the price of the share at the end of the year turns out to be Rs 267.50. Since the ending share price increased, you have made a capital gain:

Capital gain (loss) = (Selling price – Buying price) × Number of shares

Capital gain (loss) = (Rs 267.50 – Rs 225) × 100 = Rs 4,250

Your total return is:

Total return = Dividend + Capital gain

Total return = Rs 250 + Rs 4,250 = Rs 4,500

If you sold your shares at the end of the year, your cash inflows would be the dividend income plus the proceeds from the sale of shares:

Cash flow at the end of the year = Dividends + Value of sold shares

= Rs 250 + (Rs 267.50 × 100) = Rs 27,000

This amount equals to your initial investment of Rs 22,500 plus the total return of Rs 4,500: Rs 22,500 + Rs 4,500 = Rs 27,000.

Percentage returns It is more common and convenient to express returns in percentage terms. You earned a total return of Rs 4,500 on an investment of Rs 22,500. You can express your return in percentage term as given below

$$\text{Return in percentage} = \frac{\text{Rs } 4{,}500}{\text{Rs } 22{,}500} = 0.20 \text{ or } 20\%$$

Percentage returns are frequently calculated on per share basis. We have seen in the example above that returns from each share have two components: the dividend income and the capital gain. Hence, the rate of return on a share would consist of the **dividend yield** and the **capital gain yield**.[1] The **rate of return** of a share held for one year is as follows:

$$\text{Rate of return} = \text{Divident yield} + \text{Capital gain yield}$$

$$R_1 = \frac{\text{DIV}_1}{P_0} + \frac{P_1 - P_0}{P_0} = \frac{\text{DIV}_1 + (P_1 - P_0)}{P_0} \quad (1)$$

R_1 is the rate of return in year 1, DIV_1 is dividend per share received in year 1, P_0 is the price of the share in the beginning of the year and P_1 is the price of the share at the end of the year. Dividend yield is the percentage of dividend income, and it is given by dividing the dividend per share at the end the year by the share price in the beginning of the year; that is, DIV_1/P_0. Capital gain is the difference of the share price at the end and the share price in the beginning divided by the share price in the beginning; that is, $(P_1 - P_0)/P_0$. If the ending price were less than the beginning price, there would be a negative capital gain or capital loss.

In the example of India Cements, your rate of return would be as follows:

$$R = \frac{2.5}{225} + \frac{(267.50 - 225)}{225} = 0.011 + 0.189 = 0.20 \text{ or } 20\%$$

The total return of 20 per cent on your investment is made up of 1.1 per cent dividend yield and 18.9 per cent capital gain. What would be your return if the market price of India Cements' share were Rs 200 after a year? The expected rate of return would be:

$$R = \frac{2.5}{225} + \frac{200 - 225}{225} = 0.011 - 0.111 = -0.10 \text{ or } -10\%$$

You would earn a negative rate of return (–10 per cent) because of the capital loss (negative capital gain). The return of a share significantly depends on the change in its share price. The market price of a share shows wide fluctuations. Hence investment in shares is risky. The risk of a security depends on the volatility of its returns.

Unrealised capital gain or loss If an investor holds a share and does not sell it at the end of a period, the difference between the beginning and ending share prices is the unrealised capital gain (or loss). The investor must consider the unrealised capital gain (or loss) as part of her total return. The fact of the matter is that if the investor so wanted, she could have sold the share and *realised* the capital gain (or loss).

Annual Rates of Return: Example of Hindustan Lever Limited (HLL) The rate of return of a share may be calculated for a period longer than one year. Let us consider HLL's data of the market prices and dividend per share for the 10-year period from 1992 to 2001 to calculate the annual rates of return. Table 12.1 shows calculations.

Figure 12.1 plots the histogram of the year-to-year total returns on HLL share shown in Table 12.1. The heights of the bars on the horizontal axis indicate the size of returns. The yearly returns show wide variations. During the 10-year period, the highest return of 149.70 per cent was obtained in 1992 and lowest return of 7.29 per cent was obtained in 2000.

1. For a simple treatment of return and risk concepts and CAPM, see, Mullins, D.W., Does the Capital Asset Pricing Model Work? *Harvard Business Recent*, Jan-Feb. 1982, and Butters, J.K., *et. al. Case Problems in Finance*, Richard D. Irwin, 1991.

NOTES

Table 12.1: HLL's Annual Rates of Return, 1992-2001

Year	Share Price (Rs) P_t	Capital Gain (%) $P_t/P_{t-1} - 1$	Dividend Per Share (Rs), DIV_t	Dividend Yield (%) DIV_t/P_{t-1}	Rate of Return (%)
1991	24.75	—	—	—	—
1992	55.50	124.24	6.30	25.46	149.70
1993	86.25	55.41	8.40	15.14	70.54
1994	88.50	2.61	12.00	13.91	16.52
1995	93.60	5.76	15.00	16.95	22.71
1996	121.20	29.49	18.75	20.03	49.52
1997	207.60	71.29	25.50	21.04	92.33
1998	249.60	20.23	33.00	15.90	36.13
1999	337.50	35.22	43.50	17.42	52.64
2000	309.60	– 8.27	52.50	15.56	7.29
2001	322.20	4.07	27.50	8.88	12.95
Average	187.16	34.00	24.25	17.03	51.03

* In July 1991 the company issued bonus shares in the ratio of 1:2. Data are adjusted for bonus issues.

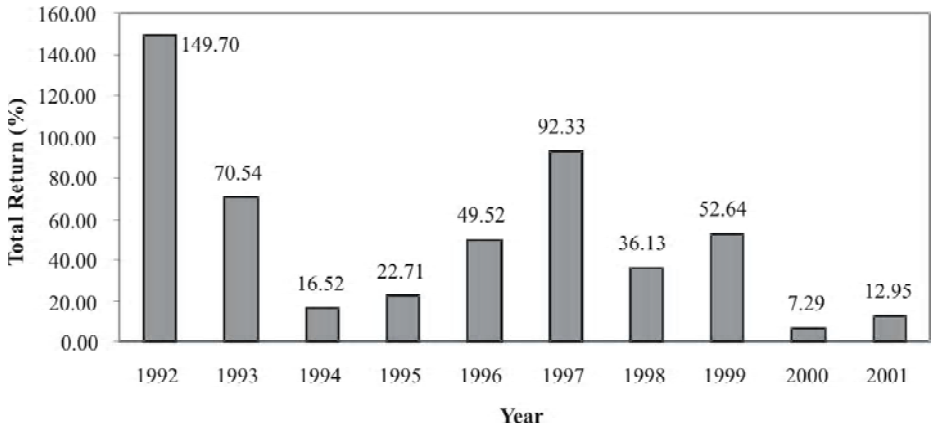


Figure 12.1: Year-to-year total returns on HLL share

Average Rate of Return Given the yearly returns, we can calculate average or mean return. The **average rate of return** is the sum of the various one-period rates of return divided by the number of periods. The average rate of return of HLL's shares for ten years can be calculated as the sum of yearly rates divided by the number of years as shown below:

$$\overline{R} = \frac{1}{10}[149.70 + 70.54 + 16.52 + 22.71 + 49.52 + 92.33 + 36.13 + 52.64 + 7.29 + 12.95]$$

$$= \frac{1}{10}[5103] = 51.03$$

The **simple arithmetic average** or mean of HLL's 10 annual returns from 1992 to 2001 is about 51 per cent. The formula for the average rate of return is as follows:

$$\overline{R} = \frac{1}{n}[R_1 + R_2 + \ldots + R_n] = \frac{1}{n}\sum_{t=1}^{n} R_t \qquad (2)$$

$\overline{R}$ is the average rate of return; R_t the observed or realised rates of return in periods 1, 2... t and n the total number of periods.

Rates of Return and Holding Periods Investors may hold their investment in shares for longer periods than for one year. How do we calculate **holding-period returns**? Suppose you invest Rs 1 today in a company's share for five years. The rates of return are 18 per cent, 9 per cent, 0 per cent, – 10 per cent and 14 per cent. What is the worth of your shares? You hold the share for five years; hence, you can calculate the worth of your investment assuming that each year dividends from the previous year are reinvested in shares. The worth of your investment after five years is:

$$\begin{aligned}\text{Investment worth after five years} &= (1 + 0.18) \times (1 + 0.09) \times (1 + 0.0) \times (1 - 0.10) \times (1 + 0.14) \\ &= 1.18 \times 1.09 \times 1.00 \times 0.90 \times 1.14 \\ &= \text{Rs } 1.32\end{aligned}$$

Your one rupee investment has grown to Rs 1.32 at the end of five years. Thus your total return is: 1.32 – 1 = 0.32 or 32 per cent. Your total return is a five-year holding-period return. How much is the annual compound rate of return? We can calculate the compound annual rate of return as follows:

$$\begin{aligned}\text{Compound annual rate of returen} &= \sqrt[5]{1.18 \times 1.09 \times 1.00 \times 0.90 \times 1.14} - 1 \\ &= 1.057 - 1 = 0.057 \text{ or } 5.7\%\end{aligned}$$

This compound rate of return is the **geometric mean return**. You can verify that one rupee invested today at 5.7 per cent compound rate would grow to approximately Rs 1.32 after five years: $(1.057)^5$ = Rs 1.32. Let us take another example. Suppose you invest Rs 1 in the beginning of 1993 in one share of HLL and hold it for two years. From Table 4.1 we see that returns for 1993 and 1994 are 16.52 per cent and 22.71 per cent. The worth of your investment at the end of two years is:

$$\text{Investment worth after two years} = (1 + 0.1652) \times (1 + 0.2271) = 1.1652 \times 1.2271 = \text{Rs } 1.43$$

Your total return is 43 per cent. This is a *two-year holding-period return*. If you hold your one rupee investment in HLL's share at the end of 1991 for 10 years until the end of 2001, it would grow to Rs 41.7 by the end of 2001. Your 10-year holding return is a whopping 407 per cent! You can calculate holding period returns for any number of years.

12.2.2 Risk of Rates of Return: Variance and Standard Deviation

We can observe in Table 12.1 that the annual rates of return of HLL's share show wide fluctuations — ranging from 7.27 per cent in 2000 to 149.70 per cent in 1992. These fluctuations in returns were caused by the volatility of the share prices. The changes in dividends also contributed to the variability of HLL's rates of return. We can think of risk of returns as the variability in rates of return.

How could one measure the variability of rates of return of a share (or an asset)? The variability of rates of return may be defined as the extent of the deviations (or dispersion) of individual rates of return from the average rate of return. There are two measures of this dispersion: **variance** or **standard deviation**. Standard deviation is the square root of variance.

How to Calculate Variance and Standard Deviation The following steps are involved in calculating variance or standard deviation of rates of return of assets or securities using historical returns:

- Calculate the average rate of return using Equation (2), i.e.,

$$\overline{R} = \frac{1}{n}\sum_{t=1}^{n} R_t$$

NOTES

- Calculate the deviation of individual rates of return from the average rate of return and square it, i.e.

$$(R_1 - \overline{R})^2$$

- Calculate the sum of the squares of the deviations as determined in the preceding step and divide it by the number of periods (or observations) less one to obtain variance, i.e.

$$\text{var} = \sigma^2 = \frac{1}{n-1}\sum_{t=1}^{n}(R_t - \overline{R})^2$$

In the case of sample of observations, we divide the sum of squares of the deviations by $n-1$ to account for the degree of freedom. If you were using population data, then the divider will be n.

- Calculate the square root of the variance to determine the standard deviation, i.e.,

$$\text{Standard deviation} = \sqrt{\text{Variance}}$$

$$\sigma = \sqrt{\sigma^2}$$

We can summarise the formulae calculating variance and standard deviation of historical rates of return of a share as follows:

$$\sigma^2 = \frac{1}{n-1}\sum_{t=1}^{n}(R_t - \overline{R})^2 \quad (3)$$

$$\sigma = \sqrt{\sigma^2} = \sqrt{\frac{1}{n-1}\sum_{t=1}^{n}(R_t - \overline{R})^2} \quad (4)$$

In Table 12.1 the ten annual rates of return for HLL's share are calculated. The average rate of return is 51.03 per cent. For HLL's rates of return sample of 10 years, you can calculate the variance and the standard deviation using Equations (3) and (4) as follows:

$$\begin{aligned}\text{Variance}(\sigma^2) &= \frac{1}{10-1}[(149.70-51.03)^2 + (70.54-51.03)^2 \\ &\quad + 16.52-51.03)^2 + (22.71-51.03)^2 + (49.52-51.03)^2 \\ &\quad + (92.33-51.03)^2 + (36.13-51.03)^2 + (52.64-51.03)^2 \\ &\quad + (7.29-51.03)^2 + (12.95-51.03)^2] \\ &= \frac{1}{9}[1740.18] = 1{,}933.80\end{aligned}$$

$$\text{Standard deviation}(\sigma) = \sqrt{1{,}933.80} = 43.97\%$$

The annual rates of return of HLL's share show a high degree of variability; they deviate on an average, by about 44 per cent from the average rate of return of 51.03 per cent. Can we use HLL's past returns as a guide for the future returns? It is difficult to say that past returns will help in assessing the future returns since HLL's returns are quite volatile. The actual rate of return in any given period may significantly vary from the historical average rate of return.

Let us consider the example of another company, viz. Jenson and Nicholson and show the application of Excel.

Check Your Progress

1. How do we measure the variability of rates of return of a share or a financial asset?

Excel Application 12.1:
Calculation of Variance and Standard Deviation

Columns B and C respectively give Jenson and Nicholson's dividend per share and share price for six years. You can enter a formula for calculating annual return in D3 as shown in the worksheet. Excel has built-in formulae to calculate average, variance and standard deviation. Let us enter formula for average in D8: = Average (D3:D7). We obtain 52 per cent as the 5-year average of Jenson and Nicholson's returns. Similarly, we can write formula for calculating variance in column D9: =Var(D3:D7) and for standard deviation in column D10: Stdev(D3:D7). We find that the standard deviation of returns is 54 per cent.

	A	B	C	D	E
1	**Year**	**DIV**	**Price**	**Return**	
2	19 x 1	1.53	31.25	-	
3	19 x 2	1.53	20.75	–28.7	**=(B3+(C3-C2))/C2*100**
4	19 x 3	1.53	30.88	56.2	
5	19 x 4	2.00	67.00	123.4	
6	19 x 5	2.00	100.00	52.2	
7	19 x 6	3.00	154.00	57.0	
8			Average	*52.0*	**=Average(D3:D7)**
9			Variance	*2915.1*	**=Var(D3:D7)**
10			Standard deviation	*54.0*	**=Stdev(D3:D7)**

12.3 PORTFOLIO THEORY

A **portfolio** is a bundle or a combination of individual assets or securities. The **portfolio theory** provides a normative approach to investors to make decisions to invest their wealth in assets or securities under risk.[2] It is based on the assumption that investors are *risk-averse*. This implies that investors hold **well-diversified portfolios** instead of investing their entire wealth in a single or a few assets. One important conclusion of the portfolio theory, as we explain later, is that if the investors hold a well-diversified portfolio of assets, then their concern should be the expected rate of return and risk of the portfolio rather than individual assets and the contribution of individual asset to the portfolio risk. The second assumption of the portfolio theory is that the returns of assets are normally distributed. This means that the mean (the expected value) and variance (or standard deviation) analysis is the foundation of the portfolio decisions. Further, we can extend the portfolio theory to derive a framework for valuing risky assets. This framework is referred to as the **capital asset pricing model** (CAPM). An alternative model for the valuation of risky assets is the **arbitrage pricing theory** (APT). In this chapter, we discuss the portfolio theory and show how CAPM and APT work in valuing assets.

12.3.1 Portfolio Return: Two-Asset Case

The **return of a portfolio** is equal to the weighted average of the returns of individual assets (or securities) in the portfolio with weights being equal to the proportion of investment value in each asset. Suppose you have an opportunity of investing your wealth either in asset *X* or asset *Y*. The possible outcomes of two assets in different states of economy are given in Table 12.2.

2. For a simple treatment of return and risk concepts and the capital asset pricing model, see Mullins, D. W., Does the Capital Asset Pricing Model Work?, *Harvard Business Review,* Jan–Feb 1982; and Butters, J.K., *et. al*., *Case Problems in Finance,* Richard D. Irwin, 1991.

NOTES

Table 12.2: Possible Outcomes of two Assets, X and Y

State of Economy	Probability	Return (%)	
		X	Y
A	0.10	– 8	14
B	0.20	10	– 4
C	0.40	8	6
D	0.20	5	15
E	0.10	– 4	20

The expected rate of return of X is the sum of the product of outcomes and their respective probability. That is:

$$E(R_x) = (-8 \times 0.1) + (10 \times 0.2) + (8 \times 0.4) + (5 \times 0.2) + (-4 \times 0.1) = 5\%$$

Similarly, the expected rate of return of Y is:

$$E(R_y) = (14 \times 0.1) + (-4 \times 0.2) + (6 \times 0.4) + (15 \times 0.2) + (20 \times 0.1) = 8\%$$

We can use the following equation to calculate the expected rate of return of individual asset:

$$E(R_x) = (R_1 \times P_1) + (R_2 \times P)_2 + (R_3 \times P_3) + ... + (R_n \times P_n)$$

$$E(R_x) = \sum_{i=1}^{n} R_i P_i \quad (5)$$

Note that $E(R_x)$ is the expected return on asset X, R_i is ith return and P_i is the probability of ith return. Consider an example.

Suppose you decide to invest 50 per cent of your wealth in X and 50 per cent in Y. What is your expected rate of return on a portfolio consisting of both X and Y? This can be done in two steps. First, calculate the combined outcome under each state of economic condition. Second, multiply each combined outcome by its probability. Table 12.3 shows calculations.

Table 12.3: Expected Portfolio Rate of Return

State of Economy (1)	Probability (2)	Combined Returns (%) X(50%) & Y (50%) (3)	Expected Return (%) (4) = (2) × (3)
A	0.10	(–8 × 0.5) + (14 × 0.5) = 3.0	0.10 × 3.0 = 0.3
B	0.20	(10 × 0.5) + (–4 × 0.5) = 3.0	0.20 × 3.0 = 0.6
C	0.40	(8 × 0.5) + (6 × 0.5) = 7.0	0.40 × 7.0 = 2.8
D	0.20	(5 × 0.5) + (15 × 0.5) = 10.0	0.20 × 10.0 = 2.0
E	0.10	(–4 × 0.5) + (20 × 0.5) = 8.0	0.10 × 8.0 = 0.8
Expected return on portfolio			6.5

There is a direct and simple method of calculating the expected rate of return on a portfolio if we know the expected rates of return on individual assets and their weights. The **expected rate of return on a portfolio** (or simply the **portfolio return**) is the weighted average of the expected rates of return on assets in the portfolio. In our example, the expected portfolio return is as follows:

$$E(R_p) = (0.5 \times 5) + (0.5 \times 8) = 6.5\%$$

In the case of two-asset portfolio, the expected rate of return is given by the following formula:

Expected return on portfolio = weight of security X × expected return on security X
+ weight of security Y × expected return on security Y

$$E(R_p) = w \times E(R_x) + (1 - w) \times E(R_y) \quad (6)$$

Note that w is the proportion of investment in asset X and $(1 - w)$ is the remaining investment in asset Y.

NOTES

Given the expected returns of individual assets, the portfolio return depends on the weights (investment proportions) of assets. You may be able to change your expected rate of return on the portfolio by changing your proportionate investment in each asset. How much would you earn if you invested 20 per cent of your wealth in X and the remaining wealth in Y? The portfolio rate of return under this changed mix of wealth in X and Y will be:

$$E(R_p) = 0.2 \times 5 + (1 - 0.2) \times 8 = 7.4\%$$

You may notice that this return is higher than what you will earn if you invested equal amounts in X and Y. The expected return would be 5 per cent if you invested entire wealth in X (i.e. $w = 1.0$). On the other hand, the expected return would be 8 per cent if the entire wealth were invested in Y (i.e., $1 - w = 1$, since $w = 0$). Your expected return will increase as you shift your wealth from X to Y. Thus, the expected return on portfolio will depend on the percentage of wealth invested in each asset in the portfolio.

What is the advantage in investing your wealth in both assets X and Y when you could expect highest return of 8 per cent by investing your entire wealth in Y? When you invested your wealth equally in assets X and Y, your expected return is 6.5 per cent. The expected return of Y (8 per cent) is higher than the portfolio return (6.5 per cent). But investing your entire wealth in Y is more risky. Under the unfavourable economic condition, Y may yield a negative return of 4 per cent. The probability of negative return is eliminated when you combine X and Y. Further, the portfolio returns are expected to fluctuate within a narrow range of 3 to 10 per cent (see column 3 of Table 12.3). You may also note that the expected return of X (5 per cent) is not only less than the portfolio return (6.5 per cent), but it also shows greater fluctuations. We discuss the concept of risk in greater detail in the following sections.

12.3.2 Portfolio Risk: Two-Asset Case

We have seen in the previous section that returns on individual assets fluctuate more than the portfolio return. Thus, individual assets are more risky than the portfolio. How is the risk of a portfolio measured? As discussed in the previous chapter, risk of individual assets is measured by their variance or standard deviation. We can use variance or standard deviation to measure the risk of the portfolio of assets as well. Why is a portfolio less risky than individual assets? Let us consider an example.

Suppose you have two investment opportunities A and B as shown in Table 12.4.

Table 12.4: Investments in A and B

Economic Condition	*Probability*	*Returns (%)*	
		A	***B***
Good	0.5	40	0
Bad	0.5	0	40

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

$$E(R_A) = 0.5 \times 40 + 0.5 \times 0 = 20\%$$
$$\sigma_A^2 = 0.5(40 - 20)^2 + 0.5(0 - 20)^2 = 400$$
$$\sigma_A = \sqrt{400} = 20\%$$

Similarly, the expected rate of return, variance and standard deviation of B are:

$$E(R_B) = 0.5 \times 0 + 0.5 \times 40 = 20\%$$
$$\sigma_B^2 = 0.5(0-20)^2 + 0.5(40-20)^2 = 400$$
$$\sigma_B = \sqrt{400} = 20\%$$

NOTES

Both investments *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 profitable and equally risky. How does combining investments *A* and *B* help an investor? If a portfolio consisting of equal amount of *A* and *B* were constructed, the portfolio return would be:

$$E(R_P) = 0.5 \times 20 + 0.5 \times 20 = 20\%$$

This return is the same as the expected return from individual securities, but without any risk. Why? If the economic conditions are good, then *A* would yield 40 per cent return and *B* zero and the portfolio return will be:

$$E(R_P) = 0.5 \times 40 + 0.5 \times 0 = 20\%$$

When economic conditions are bad, then *A*'s return will be zero and *B*'s 40 per cent and the portfolio return would still remain the same:

$$E(R_P) = 0.5 \times 0 + 0.5 \times 40 = 20\%$$

Thus, by investing equal amounts in *A* and *B*, rather than the entire amount only in *A* or *B*, the investor is able to eliminate the risk altogether. She is assured of a return of 20 per cent with a zero standard deviation.

It is not always possible to entirely reduce the risk. It may be difficult in practice to find two assets whose returns move completely in opposite directions like in the above example of securities *A* and *B*. It needs emphasis to state that the risk of portfolio would be less than the risk of individual securities, and that the risk of a security should be judged by its contribution to the portfolio risk.

Measuring Portfolio Risk for Two Assets Like in the case of individual assets, the **risk of a portfolio** could be measured in terms of its variance or standard deviation. As stated earlier, the portfolio return is the weighted average of returns on individual assets. Is the portfolio variance or standard deviation a weighted average of the individual assets' variances or standard deviations? It is not. The **portfolio variance** or **standard deviation** depends on the co-movement of returns on two assets.

Covariance: When we consider two assets, we are concerned with the co-movement of the assets. **Covariance** of returns on two assets measures their co-movement. How is covariance calculated? Three steps are involved in the calculation of covariance between two assets:

- Determine the expected returns on assets.
- Determine the deviation of possible returns from the expected return for each asset.
- Determine the sum of the product of each deviation of returns of two assets and respective probability.

Let us consider the data of securities of *X* and *Y* given in Table 5.4. The expected return on security *X* is:

$$E(R_x) = (0.1 \times -8) + (0.2 \times 10) + (0.4 \times 8) + (0.2 \times 5) + (0.1 \times -4) = 5\%$$

Security *Y*'s expected return is:

$$E(R_y) = (0.1 \times 14) + (0.2 \times -4) + (0.4 \times 6) + (0.2 \times 15) + (0.1 \times 20) = 8\%$$

If the equal amount is invested in *X* and *Y*, the expected return on the portfolio is:

$$E(R_p) = 5 \times 0.5 + 8 \times 0.5 = 6.5\%$$

Table 12.5 shows the calculations of variations from the expected return and covariance, which is the product of deviations of returns of securities *X* and *Y* and their associated probabilities:

NOTES

Table 12.5: Covariance of Returns of Securities X and Y

State of Economy	*Probability*	*Returns*		*Deviation from Expected Returns*		*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
		$E(R_x)$ = 5	$E(R_y)$ = 8			Covar = –33.0

The covariance of returns of securities *X* and *Y* is –33.0. The formula for calculating covariance of returns of the two securities *X* and *Y* is as follows:

$$\text{Cov}_{xy} = \sum_{i=1}^{n} [R_x - E(R_x)][R_y - E(R_y)] \times P_i \quad (7)$$

Note that Cov_{xy} is the covariance of returns on securities *X* and *Y*, R_x and R_y returns on securities *X* and *Y* respectively, $E(R_x)$ and $E(R_y)$ expected returns of *X* and *Y* respectively and P_i probability of occurrence of the state of economy *i*. Using Equation (7), the covariance between the returns of securities *X* and *Y* can be calculated as shown below:

$$\begin{aligned}\text{Cov}_{xy} &= 0.1(-8-5)(-14-8) + 0.2(10-5)(-4-8) \\ &\quad + 0.4(8-5)(6-8) + 0.2(5-5)(15-8) + 0.1(-4-5)(20-8) \\ &= -7.8 - 12 - 2.4 + 0 - 10.8 = -33.0\end{aligned}$$

What is the relationship between the returns of securities *X* and *Y*? There are following possibilities:

- ***Positive covariance*** *X*'s and *Y*'s returns could be above their average returns at the same time. Alternatively, *X*'s and *Y*'s returns could be below their average returns at the same time. In either situation, this implies positive relation between two returns. The covariance would be positive.
- ***Negative covariance*** *X*'s returns could be above its average return while *Y*'s return could be below its average return and vice versa. This denotes a negative relationship between returns of *X* and *Y*. The covariance would be negative.
- ***Zero covariance*** Returns on *X* and *Y* could show no pattern; that is, there is no relationship. In this situation, covariance would be zero. In reality, covariance may be non-zero due to randomness and negative and positive terms may not cancel out each other.

In our example covariance between returns on *X* and *Y* is negative, that is, – 33.0. This is akin to the second situation above; that is, two returns are negatively related. What does the number – 33.0 imply? As in the case of variance, covariance also uses squared deviations and therefore, the number cannot be explained. We can, however, compute the correlation to measure the relationship between two returns.

Correlation How can we find relationship between two variables? **Correlation** is a measure of the linear relationship between two variables (say, returns of two securities, *X* and *Y* in our case). It may be observed from Equation (7) that covariance of returns of securities *X* and *Y* is a measure of both variability of returns of securities and their association. Thus, the formula for covariance of returns on *X* and *Y* can also be expressed as follows:

$$\begin{aligned}&\text{Covariance } XY = \text{Standard deviation } X \times \text{Standard deviation } Y \times \text{Correlation } XY \\ &\text{Cov}_{xy} = \sigma_x \sigma_y \, \text{Co r}_{xy}\end{aligned} \quad (8)$$

Note that σ_x and σ_y are standard deviations of returns for securities *X* and *Y* and Cor_{xy} is the

NOTES

correlation between returns of *X* and *Y*. From Equation (8), we can determine the correlation by dividing covariance by the standard deviations of returns on securities *X* and *Y*:

$$\text{Correlation } X,Y = \frac{\text{Covariance } XY}{\text{Standard deviation } X \times \text{Standard deviation } Y}$$

$$\text{Cor}_{xy} = \frac{\text{Cov}_{xy}}{\sigma_x \sigma_y} \tag{9}$$

The value of correlation, called the **correlation coefficient,** could be positive, negative or zero. It depends on the sign of covariance since standard deviations are always positive numbers. The correlation coefficient always ranges between – 1.0 and + 1.0. A correlation coefficient of + 1.0 implies a **perfectly positive correlation** while a correlation coefficient of – 1.0 indicates a **perfectly negative correlation**. The correlation between the two variables will be zero (or not different from zero) if they are not at all related to each other. In a number of situations, returns of any two securities maybe weakly correlated (negatively or positively).

Let us calculate correlation by using data given in Table 12.5. The covariance is – 33.0. We need standard deviations of *X* and *Y* to compute the correlation. The standard deviation of securities *X* and *Y* are as follows:

$$\begin{aligned}
\sigma_x^2 &= 0.1(-8-5)^2 + 0.2(10-5)^2 + 0.4(8-5)^2 + 0.2(5-5)^2 + 0.1(-4-5)^2 \\
&= 16.9 + 3.6 + 0 + 8.1 = 33.6 \\
\sigma_x &= \sqrt{33.6} = 5.80\% \\
\sigma_y^2 &= 0.1(14-8)^2 + 0.2(-4-8)^2 + 0.4(6-8)^2 + 0.2(15-8)^2 + 0.1(20-8)^2 \\
&= 3.6 + 28.8 + 1.6 + 9.8 + 14.4 = 58.2 \\
\sigma_y &= \sqrt{58.2} = 7.63\%
\end{aligned}$$

The correlation of the two securities *X* and *Y* is as follows:

$$\text{Cor}_{xy} = \frac{-33.0}{5.80 \times 7.63} = \frac{-33.0}{44.25} = -0.746$$

Securities *X* and *Y* are negatively correlated. The correlation coefficient of – 0.746 indicates a high negative relationship. If an investor invests her wealth in both instead any one of them, she can reduce the risk. How?

Variance and Standard Deviation of a Two-Asset Portfolio We know now that the variance of a two-asset portfolio is not the weighted average of the variances of assets since they co-vary as well. The variance of two-security portfolio is given by the following equation:

$$\sigma_p^2 = \sigma_x^2 w_x^2 + \sigma_y^2 w_y^2 + 2 w_x w_y \text{ Co var}_{xy} = \sigma_x^2 w_x^2 + \sigma_y^2 w_y^2 + 2 w_x w_y \sigma_x \sigma_y \text{ Cor}_{xy} \tag{10}$$

It maybe noticed from Equation (10) that the variance of a portfolio includes the proportionate variances of the individual securities and the covariance of the securities. The covariance depends on the correlation between the securities in the portfolio. The risk of the portfolio would be less than the weighted average risk of the securities for low or negative correlation. It is a common practice to use a tabular approach, as given Table 12.6, to calculate the variance of a portfolio:

The first two parts of Table 12.6 contain the variance, covariance and weights of two securities, *X* and *Y*, in the portfolio. The third part gives the cell-by-cell product of the values in the two part. We can obtain Equation (10) when we add all values in the third part.

Using the sequences of Table 12.7, the variance of the portfolio of securities *X* and *Y* is given below:

The total of values in the third table: 8.40 – 8.25 – 8.25 + 14.55 = 6.45 is the variance of the portfolio of securities *X* and *Y*.

Table 12.6: Convariance Calculation Matrix

I		*II*		*III*	
σ_x^2	Cov_{xy}	w_x^2	$w_x w_y$	$\sigma_x^2 w_x^2$	$w_x w_y \text{Cov}_{xy}$
Cov_{xy}	σ_y^2	$w_x w_y$	w_y^2	$w_x w_y \text{Cov}_{xy}$	$\sigma_y^2 w_y^2$

Applying Equation (10), the variance of portfolio of *X* and *Y* will be as follows:

$$\sigma_p^2 = 33.6(0.5)^2 + 58.2(0.5)^2 + 2(0.5)(0.5)(5.80)(7.63)(-0.746)$$
$$= 8.4 + 14.55 - 16.51 = 6.45$$

The standard deviation of two-asset portfolio is the square root of variance:

$$\sigma_p = \sqrt{\sigma_x^2 w_x^2 + \sigma_y^2 w_y^2 + 2 w_x w_y \sigma_x \sigma_y \text{Cor}_{xy}}$$
$$\sigma_p = \sqrt{6.45} = 2.54\% \qquad (11)$$

Table 12.7: Covariance calculation Matrix: Example

I		*II*		*III*	
σ_x^2 33.6	Cov_{xy} –33.0	w_x^2 $(0.5)^2 = 0.25$	$w_x w_y$ (0.5(0.5) = 0.25	$\sigma_x^2 w_x^2$ (33.6)(0.25) = 8.40	$w_x w_y \text{Cov}_{xy}$ (0.25)(–33.0) = –8.25
Cov_{xy} –33.0	σ_y^2 58.20	$w_x w_y$ (0.5)(0.5) = 0.25	w_y^2 $(0.5)^2 = 0.25$	$w_x w_y$ Cov_{xy} (0.25)(–33.0) = –8.25	$\sigma_y^2 w_y^2$ (58.2)(0.25) = 14.55

12.4 RISK DIVERSIFICATION: SYSTEMATIC AND UNSYSTEMATIC RISK

Can diversification reduce all risk of securities? We just explained that when more and more securities are included in a portfolio, the risk of individual securities in the portfolio is reduced. This risk totally vanishes when the number of securities is very large. But the risk represented by covariance remains. Thus, risk has two parts: diversifiable (unsystematic) and non-diversifiable (systematic).[3]

12.4.1 Systematic Risk

Systematic risk arises on account of the economy-wide uncertainties and the tendency of individual securities to move together with changes in the market. This part of risk cannot be reduced through diversification. It is also known as **market risk**. Investors are exposed to market risk even when they hold well-diversified portfolios of securities.[4] The examples of systematic or market risk are given in Table 12.8.

Table 12.8: Examples of Systematic Risk

- The government changes the *interest rate policy.* The *corporate tax* rate is increased.
- The government resorts to massive *deficit financing*.
- The *inflation* rate increases.
- The RBI promulgates a restrictive *credit policy.*
- The government relaxes the *foreign exchange* controls and announces full *converti-bility* of the Indian rupee.
- The government withdraws tax on dividend payments by companies.
- The government eliminates reduces the capital gain tax rate.

Check Your Progress

2. What are the main methods of measuring portfolio risk?

3. Sharpe, *op. cit.*
4. *Ibid.*, p. 441.

NOTES

12.4.2 Unsystematic Risk

Unsystematic risk arises from the unique uncertainties of individual securities. It is also called **unique risk**. These uncertainties are diversifiable if a large numbers of securities are combined to form well-diversified portfolios. Uncertainties of individual securities in a portfolio cancel out each other. Thus unsystematic risk can be totally reduced through diversification. Table 12.9 contains examples of unsystematic risks.

Table 12.9: Examples of Unsystematic Risk

• The company workers declare strike. • The R&D expert leaves the company. • A formidable competitor enters the market. • The company loses a big contract in a bid.	• The company makes a breakthrough in process innovation. • The government increases custom duty on the material used by the company. • The company is unable to obtain adequate quantity of raw material

12.4.3 Total Risk

Total risk of an individual security is the variance (or standard deviation) of its return. It consists of two parts:

$$\text{Total risk of a security} = \text{Systematic risk} + \text{Unsystematic risk} \quad (12)$$

Systematic risk is the covariance of the individual securities in the portfolio. An investor has to suffer the systematic risk, as it cannot be diversified away. The difference between variance and covariance is the diversifiable or unsystematic risk. Thus, Equation (12) can be written as:

$$\text{Variance of security} = \text{covariance of portfolio} + (\text{variance of security} - \text{covariance of portfolio}) \quad (13)$$

Total risk is not relevant for an investor who holds a diversified portfolio. The systematic risk cannot be diversified, and therefore, she will expect a compensation for bearing this risk. She will be more concerned about that portion of the risk of individual securities that she cannot diversify.

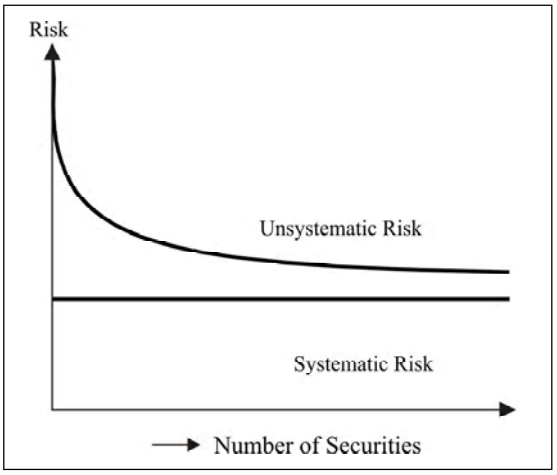


Figure 12.2: Systematic and unsystematic risk and number of securities

Figure 12.2 shows that unsystematic risk can be reduced as more and more securities are added to a portfolio. How many securities should be held by an investor to eliminate unsystematic risk? In USA, it has been found that holding about fifteen shares can eliminate unsystematic risk.[5] In the Indian context, a portfolio of 40 shares can almost totally eliminate unsystematic risk.[6] Diversification is not able to reduce the systematic risk. Thus the source of risk for an investor who

Check Your Progress

3. Differentiate between systematic and unsystematic risks of securities.

5. Evans, J.L. and Archer, S.H., Diversification and the Reduction of Dispersion: An Empirical Analysis, *Journal of Finance* (December 1968), pp. 761–69.
6. Gupta, L.C., *Rates of Return on Equities: The Indian Experience*, Delhi, Oxford, 1981, pp. 30–35.

NOTES

holds a well-diversified portfolio is that the market will swing due to economic activities affecting the investor's portfolio. Typically, the diversified portfolios move with the market. The most common well-diversified portfolios in India include the share indices of the Bombay Stock Exchange and the National Stock Exchange. In a study in USA, it is found that market risk contributes about 50 per cent variation in the price of a share.[7] Thus diversification may be able to eliminate only half of the total risk (viz. unsystematic risk). How can we measure systematic (that is, market) risk? What is the relationship between risk and return?

12.5 CAPITAL ASSET PRICING MODEL (CAPM)

We have so far discussed the principles of making portfolio choices by investors. We also considered the significance of the risk-free asset in portfolio decisions. In the presence of the risk-free asset, the capital market line (CML) is the relevant efficient frontier, and all investors would choose to remain on CML. This implies that the relevant measure of an asset's risk is its covariance with the market portfolio of risky assets. How do we determine the required rate of return on a risky asset? How is an asset's risk related to its required rate of return?

The **capital asset pricing model** (CAPM) is a model that provides a framework to determine the required rate of return on an asset and indicates the relationship between return and risk of the asset. The required rate of return specified by CAPM helps in valuing an asset. One can also compare the expected (estimated) rate of return on an asset with its required rate of return and determine whether the asset is fairly valued. As we explain in this section, under CAPM, the **security market line** (SML) exemplifies the relationship between an asset's risk and its required rate of return.

12.5.1 Assumptions of CAPM

The capital asset pricing model, or CAPM, envisages the relationship between risk and the expected rate of return on a risky security. It provides a framework to price individual securities and determine the required rate of return for individual securities. It is based on a number of simplifying assumptions. The most important assumptions are:[8]

- ***Market efficiency*** The capital market efficiency implies that share prices reflect all available information. Also, individual investors are not able to affect the prices of securities. This means that there are large numbers of investors holding small amount of wealth.
- ***Risk aversion and mean-variance optimisation*** 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 returns for a given level of risk. This implies that investors are mean-variance optimisers and they form efficient portfolios.
- ***Homogeneous expectations*** All investors have the same expectations about the expected returns and risks of securities.
- ***Single time period*** All investors' decisions are based on a single time period.
- ***Risk-free rate*** All investors can lend and borrow at a risk-free rate of interest. They form portfolios from publicly traded securities like shares and bonds.

12.5.2 Characteristics Line

We know from the earlier discussion that risk has two parts: unsystematic risk, which can be eliminated through diversification and systematic risk, which cannot be reduced. Since unsystematic risk can be mostly eliminated without any cost, there is no price paid for it. Therefore, it will have no influence on the return of individual securities. Market will pay premium only for systematic risk since it is non-diversifiable. How can we measure the risk of individual securities and their risk-adjusted required rates of return? Let us consider an example.

7. King, B.F., market and Industry Factors in Stock Price Behaviour, *Journal of Business, 39*, 1 (Jan 1966), pp. 139–90.
8. Sharpe, *op. cit.* Also see Fisher, D.E. and Jordan, R.J., *Security Analysis and Portfolio Management*, Prentice-Hall of India, 1990, p. 622.

NOTES

The following table gives probable rates of return on market portfolio and on Alpha Company's share. There are two possibilities with regard to market conditions, either the market will rise or it will fall. Under each market condition, there are two equally likely outcomes for both the market portfolio and Alpha.

Market Conditions	*Market Return (%)*	*Return on Alpha Co.'s Share (%)*
Rising Market	25	30
Rising Market	20	25
Falling Market	–15	–25
Falling Market	–10	–15

Let us examine the behaviour of the market return and return on Alpha's share. The expected return for the market and Alpha are as follows:

Rising market:

Expected market return = 0.5 × 25 + 0.5 × 20 = 22.5%

Expected Alpha return = 0.5 × 30 + 0.5 × 25 = 27.5%

Falling market:

Expected market return = 0.5 × –15 + 0.5 × –10 = –12.5%

Expected Alpha return = 0.5 × –25 + 0.5 × –15 = –20.0%

The market return in the rising market is 22.5 per cent and it is –12.5 per cent in the falling market. This means that the market return is 35 per cent higher in the rising market *compared* to the market return in the falling market. In case of Alpha, the return in the rising market is 47.5 per cent higher compared to the market return in the falling market. How sensitive is Alpha's return in relation to the market return? Alpha's return increases by 47.5 per cent compared to 35 per cent increase in the market return in the rising market conditions. Alternatively, Alpha's return declines by 47.5 per cent compared to 35 per cent decrease in the market return in the falling market conditions. Thus the sensitivity of the Alpha's return vis-à-vis the market return is: 47.5%/35% = 1.36. We can refer to this number as the **sensitivity coefficient or index.** The sensitivity coefficient of 1.36 implies that for a unit change (increase or decrease) in the market return, Alpha's return will change by 1.36 times. The sensitivity of the Alpha's return vis-á-vis the market return reflects its risk. The sensitivity coefficient is called **beta.**

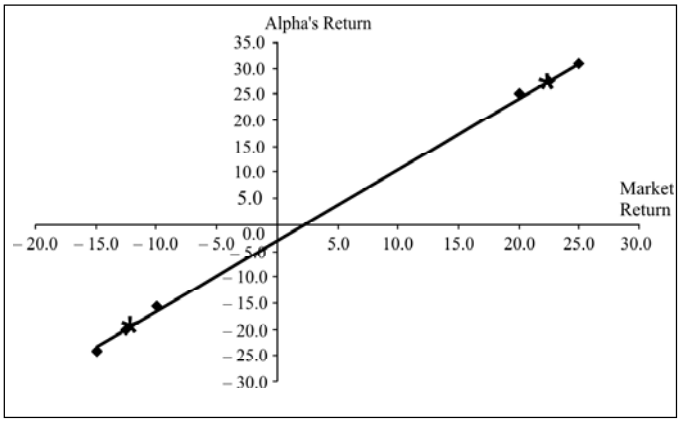


Figure 12.3: Characteristics Line: Market Return vs. Alpha's Return

We plot the combinations of four possible returns of Alpha and market in Figure 12.3. They are shown as four points. The combinations of the expected returns points (22.5%, 27.5% and –12.5%, –20%) are also shown in the figure. We join these two points to form a line. This line is called the **characteristics line**. The slope of the characteristics line is the sensitivity coefficient, which, as stated earlier, is referred to as beta.

12.5.3 Security Market Line (SML)

Under CAPM, risk of an individual risky security is defined as the volatility of the security's return vis-á-vis the return of the market portfolio. This risk of an individual risky security is its systematic risk. Systematic risk is measured as the covariance of an individual risky security with the market portfolio. Figure 12.4 shows the relationship between return and risk as measured by covariance.

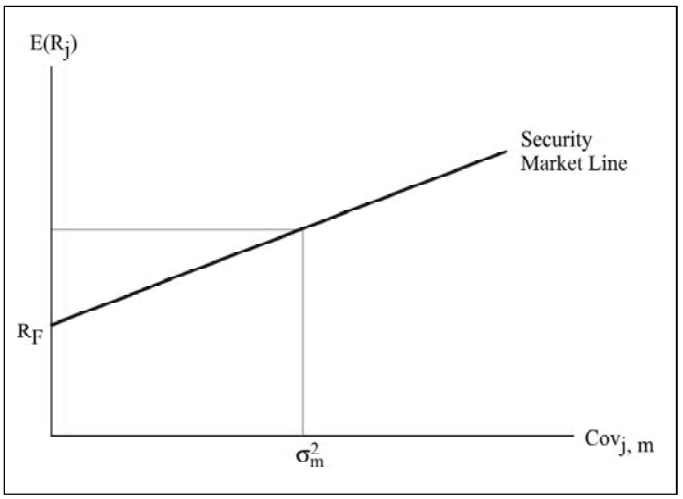


Figure 12.4: Security market line

The covariance of any asset with itself is represented by its variance ($covar_{j,j} = \sigma^2_j$). The return on market portfolio should depend on its own risk, which is given by the variance of the market return (σ^2_M). Therefore, the risk-return relationship equation is as follows:

$$E(R_j) = R_f + \frac{E(R_m) - R_f}{\sigma^2_m}\left(\text{covar}_{j,m}\right) \tag{14}$$

The term, $covar_{j,m}/\sigma^2_m$ is called the security beta, β_j. Beta is a standardised measure of a security's systematic risk. The beta of the market portfolio is 1. The market portfolio is the reference for measuring the volatility of individual risky securities. Since a risk-free security has no volatility, it has zero beta. We can rewrite the equation for SML as follows:[9]

$$E(R_j) = R_f + [E(R_m) - R_f]\beta_j \tag{15}$$

where $E(R_j)$ is the expected return on security j, R_f the risk-free rate of interest, R_m the expected return on the market portfolio and β_j the undiversifiable risk of security j.

Figure 12.5 illustrates SLM with normalised systematic risk as measured by beta. Figure 12.5 and Equation (15) show that the required rate of return on a security is equal to a risk-free rate plus the risk-premium for the risky security. The **risk-premium** on a risky security equals the **market risk premium**, that is, the difference between the expected market return and the risk-free rate. Since the market risk premium is same for all securities, the total risk premium varies directly with systematic risk measured by beta. For a given amount of systematic risk (β), SML shows the required rate of return. A security's beta of 1 indicates systematic risk equal to the aggregate market risk and the required rate of return on the security will be equal to the market rate of return. If the security's beta is greater than 1, then its systematic risk is greater than the aggregate market. This implies that the security's returns fluctuate more than the market returns, and the security's required rate of return will be more than the market rate of return. On the other hand, a security's beta of less than 1 means that the security's risk is lower than the aggregate market risk. This implies that the security's returns are less sensitive to the changes in the market returns. The security's required rate of return will be less than the market rate of return. Can a security's beta be negative?

9. Sharpe, *op. cit.*

NOTES

Theoretically, beta can be negative. A security with negative beta would earn less than the risk-free rate of return.

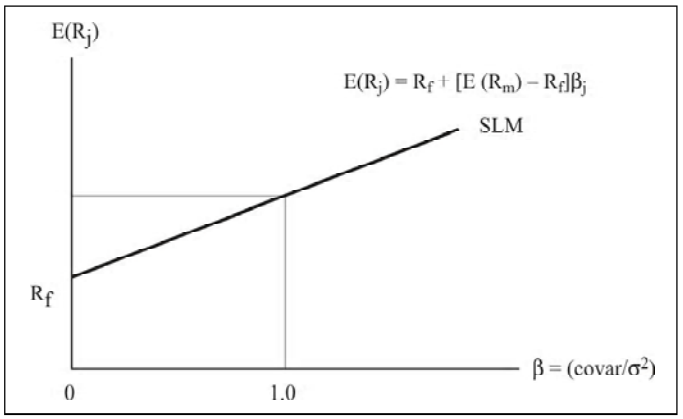


Figure 12.5: Security market line with normalised systematic risk (β)

Illustration 12.1: Required Rate of Return Calculation

The risk free rate of return is 8 per cent and the market rate of return is 17 per cent. Betas for four shares, *P, Q, R* and *S* are respectively 0.60, 1.00, 1.20 and –0.20. What are the required rates of return on these four shares? We can use Equation (21) to calculate the required rates of return.

$$E(R_j) = R_f + [E(R_m) - R_f]\beta_j$$
$$E(R_P) = 0.08 + (0.17 - 0.08) \times 0.60 = 0.134 \text{ or } 13.4\%$$
$$E(R_Q) = 0.08 + (0.17 - 0.08) \times 1.00 = 0.170 \text{ or } 17.0\%$$
$$E(R_R) = 0.08 + (0.17 - 0.08) \times 1.20 = 0.188 \text{ or } 18.8\%$$
$$E(R_S) = 0.08 + (0.17 - 0.08) \times -0.20 = 0.062 \text{ or } 6.2\%$$

Q with beta of 1.00 has a return equal to the market return. *P* has beta lower than 1.00, therefore its required rate of return is lower than the market return. *R* has a return greater than the market return since its beta is greater than 1.00. *S* has a return lower than the risk-free rate since it has a negative beta.

CML vs. SML What is the difference between CML and SML? The CML represents the risk premiums of efficient portfolios as a function of portfolio standard deviation. The SML, on the other hand, depicts individual security risk premium as a function of security risk. The individual security risk is measured by the security's beta. Beta reflects the contribution of the security to the portfolio risk. We can notice from Equation (14) that if a security's return is perfectly positively correlated with the return on the market portfolio, then CML totally coincides with SML with the same slope, viz., σ_j/σ_m.

All fairly valued assets exactly lie on the SML. The required rates of return of such assets are consistent with their risk. The under-priced assets shall lie above the SML and their required rates of return are higher than as implied by the CAPM. On the other hand, overpriced assets lie below the SML and their required rates of return are lower than as implied by the CAPM.

12.6 IMPLICATIONS AND RELEVANCE OF CAPM

CAPM is based on a number of assumptions. Given those assumptions, it provides a logical basis for measuring risk and linking risk and return.

12.6.1 Implications

CAPM has the following implications:

- Investors will always combine a risk-free asset with a market portfolio of risky assets. They will invest in risky assets in proportion to their market value.

- Investors will be compensated only for that risk which they cannot diversify. This is the market-related (systematic) risk. Beta, which is a ratio of the covariance between the asset returns and the market returns divided by the market variance, is the most appropriate measure of an asset's risk.
- Investors can expect returns from their investment according to the risk. This implies a linear relationship between the asset's expected return and its beta.

The concepts of risk and return as developed under CAPM have intuitive appeal and they are quite simple to understand. Financial managers use these concepts in a number of financial decision-making such as valuation of securities, cost of capital measurement, investment risk analysis etc. However, in spite of its intuitive appeal and simplicity, CAPM suffers from a number of practical problems.

12.6.2 Limitations of CAPM

CAPM has the following limitations:

- It is based on unrealistic assumptions
- It is difficult to test the validity of CAPM
- Betas do not remain stable over time.

Unrealistic assumptions CAPM is based on a number of assumptions that are far from the reality. For example, it is very difficult to find a risk-free security. A short-term, highly liquid government security is considered as a risk-free security. It is unlikely that the government will default, but inflation causes uncertainty about the real rate of return. The assumption of the equality of the lending and borrowing rates is also not correct. In practice, these rates differ. Further, investors may not hold highly diversified portfolios, or the market indices may not be well diversified. Under these circumstances, CAPM may not accurately explain the investment behaviour of investors and beta may fail to capture the risk of investment.

Testing CAPM Most of the assumptions of CAPM may not be very critical for its practical validity. What we need to know, therefore, is the empirical validity of CAPM. We need to establish that beta is able to measure the risk of a security and that there is a significant correlation between beta and the expected return. The empirical results have given mixed results. The earlier tests showed that there was a positive relation between returns and betas. However, the relationship was not as strong as predicted by CAPM. Further, these results revealed that returns were also related to other measures of risk, including the firm-specific risk. In subsequent research, some studies did not find any relationship between betas and returns. On the other hand, other factors such as size and the market value and book value ratios were found as significantly related to returns.[10]

All empirical studies testing CAPM have a conceptual problem. CAPM is an *ex-ante* model; that is, we need data on expected prices to test CAPM. Unfortunately, in practice the researchers have to work with the actual past (ex-post) data. Thus this will introduce bias in the empirical results.

Stability of beta 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 the market portfolio. Thus, they can only estimate beta based on historical data. Investors can use historical beta as the measure of future risk only if it is stable over time. Most research has shown that the betas of individual securities are not stable over time. This implies that historical betas are poor indicators of the future risk of securities.

CAPM is a useful device for understanding the risk-return relationship in spite of its limitations. It provides a logical and quantitative approach for estimating risk. It is better than many alternative subjective methods of determining risk and risk premium. One major problem in the use of CAPM is that many times the risk of an asset is not captured by beta alone.

10. Fama, E.F. and French, R.R., The cross-section of Expected Returns, *Journal of Finance,* No. 47, 1992, pp. 427–66.

NOTES

12.7 FINANCIAL GOALS AND STRATEGY

Financial goals are the quantitative expressions of a company's mission and strategy, and are set by its long-term planning system as a trade-off among conflicting and competing interests. In a study of twelve large American corporations, Donaldson has identified several characteristics of a company's financial goals system:[11]

EXHIBIT 12.1: FINANCIAL GOALS OF INDIAN COMPANIES

The financial goals which a company may be expected to pursue can be categorised into four groups (see box). In a study of 57 Indian companies, it was found that each company sets multiple goals for itself. For example, in the first group of goals, the most preferred one is the maximisation of operating profit before interest and taxes; as many as 24 companies (42%) have ranked it either in the first or second place. All other goals get low preferences in this group. In the second group, the maximisation of return on investment gets the highest priority. The maximisation of growth in sales is preferred by a large number of companies in different degree in the third group of goals. Similarly, in the fourth group, a significant number of companies consider funds availability as an important goal.

The results reveal that goals which depend on market-determined variables get low priority in the financial decisions of Indian companies. In fact, companies seem to define financial goals in terms of the variable over which they have control.

The four relatively important goals pursued by companies in India are: ensuring the availability of funds, maximising growth, maximising operating profits before interest and taxes, and maximising the rate of return on investment. The study shows that the simultaneous pursuit of these goals which interact with one another, explains partly the significant variation in financial performance across the sample companies. It is pertinent to underscore that companies seem to have a tendency to strive to maximise sales growth even if it is negatively related to financial performance. Thus, in practice, managers prefer to achieve higher sales growth even at the cost of low profitability. Yet another notable finding of the study is that managers do not—in practice—aim to maximise the market value of their companies' shares while making financial decisions.

Source: Pandey, I M and Bhat, Ramesh, Fulfilling Financial Goals, *Business World*, March 29-April 11, 1989.

Key Financial Goals

- ***Maximising the levels***
  1. Book value of net worth
  2. Market value of per share
  3. Cash flow per share
  4. Operating profit before interest and tax.
- ***Maximising the ratio of***
  1. Price—earnings
  2. Market rate of return
  3. Return on investment
  4. Net profit to net worth
  5. Net profit margin
  6. Market share
- ***Maximising the growth in***
  1. Earnings per share
  2. Total assets
  3. Sales
- ***Ensuring that funds are available***

11. Donaldson G., Financial Goals and Strategic Consequences, *Harvard Business Review*, May–June 1985, pp. 57–66.

NOTES

- Companies are not always governed by the maximum profit criterion.
- Financial priorities change according to the changes in the economic and competitive environment.
- Competition sets the constraints within which a company can attain its goals.
- Managing a company's financial goals system is a continuous process of balancing different priorities in a manner that the demand for and supply of funds is reconciled.
- A change in any goal cannot be effected without considering the effect on other goals.
- Financial goals are changeable and unstable, and therefore, managers find it difficult to understand and accept the financial goals system.

In practice, the financial goals system boils down to the management of flow of funds. The objectives of growth and return can assume different priorities during the life cycle of a company. For fulfilling its desire of attaining high growth, a company may have to sacrifice superior return. Similarly, it may be able to achieve maximum return by constraining its growth. For supporting its growth target, a company needs to ensure adequate supply of funds which require trade-offs among the company's dividend or debt policies or various sources of funds. A financial goals system of low payout and high debt will provide a profitable firm an opportunity to sustain a high level of sales growth.

Corporate managers in India consider the following four financial goals as the most important (Exhibit 12.1):

- ensuring fund availability
- maximising growth
- operating profit before interest and taxes
- return on investment

It is notable that in the recent times more and more companies in India are focusing on shareholder value creation. These companies have adopted different methods of measuring shareholder value. A number of then measure and report economic value added (EVA), market value added (MVA), and the shareholder return based on the market value of shares.

12.8 SHAREHOLDER VALUE CREATION

The value of a firm is the market value of its assets which is reflected in the capital markets through the market values of equity and debt. Thus, shareholder value is:

Shareholder value = Market value of the firm – Market value of debt

The market value of the shareholders' equity is directly observable from the capital markets. In theory, the market value should be equal the warranted economic value of the firm. The true economic value of a firm or business or division or project or any strategy depends on the cash flows and the appropriate discount rate (commensurate with the risk of cash flows). In the earlier chapters, we have discussed methods for calculating the present or economic value of a firm or a business/division or a project. Here we shall discuss briefly three most commonly advocated methods of shareholder value.

The first method, called the free cash flow method, uses the weighted average cost of debt and equity (WACC) to discount free cash flows. You may recall that free cash flows are calculated as follows:

$$FCF = PBIT\ (1 - T) + DEP \pm ONCI \pm \Delta NWC - \Delta CAPEX \quad (16)$$

Notice that PBIT = profit before interest and tax, T = corporate tax rate, DEP = tax depreciation, ONCI = other non-cash items, ΔNWC = change in net working capital (i.e., stocks plus trade debtors minus trade creditors), and ΔCAPEX = incremental investment. When the value of a firm or a business over a planning horizon is calculated, then an estimate of the terminal cash flows or value (TV) will also be made. The firm or the business is expected to grow at a high rate during the

Check Your Progress

4. List the important financial goals that a company should have.

NOTES

planning horizon and then, competition may force cash flows to remain constant or grow at a low rate. Terminal or residual value reflects the value of post-planning cash flows. Thus, the economic value or simply value of a firm or a business is:

Economic value = PV of net operating cash flows (NOCF) + PV of terminal value

$$V = \sum_{t=1}^{n} \frac{FCF_t}{(1+WACC)^t} + \frac{TV_n}{(1+WACC)^n} \quad (17)$$

The value of a firm or a business generating perpetual FCF will be as follows:

$$V = \frac{FCF}{WACC} \quad (18)$$

You may recall that FCF estimates do not make any adjustment for interest charges. Thus, FCF do not include financing (leverage) effect, and therefore, they are **unlevered** or **ungeared cash flows.** The weighted average cost of capital (WACC) includes after-tax cost of debt. Hence the financing effect is incorporated in WACC rather than cash flows. WACC, you may, recall, is calculated as follows:

$$WACC = k_e\left(\frac{E}{V}\right) + k_d(1-T)\left(\frac{D}{V}\right) \quad (19)$$

You may recall that WACC is based on the assumptions that the firm has an optimum (or target) capital structure and that debt is perpetual. These assumptions may not hold in practice and therefore, the use of WACC may not be appropriate for determining the economic value of a firm or a business or a project.

The second method calculates the economic value of a firm or business into two parts: the economic value of unlevered firm and the economic value of the financing effects. The value of an unlevered firm over its planning period is given as follows:

$$V_u = \sum_{t=1}^{n} \frac{FCF_t}{(1+k_u)^t} + \frac{TV_n}{(1+k_u)^n} \quad (20)$$

Notice that k_u is the cost of capital of an unlevered firm. For the levered firm, the second part includes the value of interest tax shield (V_{ITS}):

$$V_{ITS} = \sum_{t=1}^{n} \frac{ITS_t}{(1+k_d)} \quad (21)$$

Thus, the value of a levered firm or business is:

Value of a levered firm = Value of unlevered firm + Value of interest fax shield

We can obtain the warranted value of shareholders' equity as the difference between the economic value of the firm and the claims of debt-holders. The value per share (VPS) can be obtained by dividing the value of shares (E) by the number of shares (N):

$$VPS = \frac{E}{N} \quad (22)$$

We can summarise the steps involved in the second method of estimation of the firm's total value and the shareholder value as follows:

1. Estimate the firm's unlevered cash flows and terminal value.
2. Determine the unlevered cost of capital (k_u).
3. Discount the unlevered cash flows and the terminal value by the unlevered cost of capital.
4. Calculate the present value of the interest tax shield discounting at the cost of debt.
5. Add these two values to obtain the levered firm's total value.
6. Subtract the value of debt from the total value to obtain the value of the firm's shares.
7. Divide the value of shares by the number of shares to obtain the economic value per share.

NOTES

The third method for determining the shareholder economic value is to calculate the value of equity by discounting cash flows available to shareholders by the cost of equity. The equity cash (ECF) flows are adjusted of cash flows related to debt.

Equity cash flows are net of interest charges and investments, and, therefore, at the corporate level they coincide with dividends. Equity cash flows reflect the expected growth in future cash flows. At the end of the planning period (the term of investment), the terminal or residual value of investment will have to be estimated. The economic value of equity is given by the discounted value of equity cash flows plus the present value of terminal value.

12.8.1 Market Value Added

Does higher growth and accounting profitability lead to increased value to shareholders? Modern financial management posits that a firm must seek to maximise the shareholder value. As stated earlier, market value of the firm's shares is a measurement of the shareholder wealth. It is the shareholders' appraisal of the firm's efficiency in employing their capital. The capital contributed by shareholders is reflected by the book value of the firm's shares. In terms of market and book values of shareholder investment, **shareholder value creation** (SVC) may be defined as the excess of market value over book value. SVC is also referred to as the **market value added** (MVA):

Market value added = Marked value – Invested capital (23)

Market value is also referred to as the "**enterprise value**". It is the total of the firm's market value (MV) of debt and market value of equity. Invested capital (IC) or capital employed (CE) is the amount equity capital and debt capital supplied by the firm's shareholders and debt-holders to finance assets. The firm is said to have created value if MVA is positive; that is, the firm's MV is in excess of IC (or CE). MVA accrues to shareholders since subtracting IC sets off debt-holders' claims from MV. Hence MVA may also be calculated as the difference between market value of equity and invested equity capital. Managers must aim at earning higher MVA for shareholders. You may recall from our earlier discussion on valuation that MV increases only when the firm earns a return in excess of the cost of capital on invested capital. MVA would be reduced if the firm invests capital in negative NPV projects.

There is conceptual problem with MVA. Invested capital is at historical value. Considering the alternative opportunities of equivalent risk, the **economic value** of the invested capital would be much higher today. Suppose the market value of an entirely equity-financed firm, which was incorporated 10 years ago, is Rs 500 crore. The shareholders' investment remains Rs 200 crore. The firm's MVA = Rs 500 crore – Rs 200 crore = Rs 300 crore. Suppose the firm's cost of equity is 10 per cent (through out the 10-year period). This implies that the shareholders' investment after 10 years would have grown to: Rs 200 $(1.10)^{10}$ = Rs 519 crore. The amount of Rs 519 crore is the economic value of invested capital. The market value of the equity is Rs 500 crore. Thus, in effect, the firm has destroyed value of about Rs 19 crore. Thus,

MVA = Market value – Economic value = 500 – 5/9 = – Rs 19 (24)

Yet another problem with MVA is that it ignores cash flows received by shareholders in the form of dividends and share buyback and cash contributed by them as additional share capital. We can easily incorporate these factors into the calculation of MVA. The economic value of invested equity capital would be equal the future value of dividends, share buyback and additional capital invested. You can use the firm's cost of equity to calculate the economic value.

12.8.2 Market-to-Book Value (M/B)

An alternative measure of shareholder value creation is the market-to-book value (M/B) approach. As you know, the market value of equity is given as follows:

Market value of equity = Market value of the firm – Market value of debt (25)

We obtain market value per share (*M*) when we divide the market value of equity by the number of shares outstanding. Similarly, the book value per share (*B*) can be calculated by dividing invested equity capital by the number of shares outstanding. A firm is said to create shareholder

NOTES

value when its market value per share is greater than its book value per share; that is, $M > B$. The market-to-book value (M/B) analysis implies the following:

- **Value creation** If $M/B > 1$, the firm is creating value of shareholders.
- **Value maintenance** If $M/B = 1$, the firm is not creating value of shareholders.
- **Value destruction** If $M/B < 1$, the firm is destroying value of shareholders.

As explained earlier in the book, the market value of a firm's share is the present value of the expected stream of dividend per share (DIV). DIV depends on the firm's payout ratio ($1 - b$) and the earnings growth (g). Earnings growth depends on the retention ratio (b) and the return on equity (ROE):

$$g = b \times \text{ROE}$$

The stream of DIV is discounted at the cost of equity (k_e). The market value per share is given as follows equation:

$$M = \sum_{t=1}^{\infty} \frac{\text{DIV}_t}{(1+k_e)^t} = \sum_{t=1}^{\infty} \frac{\text{EPS}_t(1-b)}{(1+k_e)^t} \tag{26}$$

In Equation (26), DIV (dividend per share) is expected to grow at a constant rate, g. That is,

$$\text{DIV}_t = \text{DIV}_{t-1}(1+g) = \text{DIV}_0(1+g)^t$$

If we assume an infinite time period ($n = \infty$), then Equation (26) can be simplified as follows:

$$M = \frac{\text{DIV}_1}{k_e - g} = \frac{\text{EPS}_1(1-b)}{k_e - g} \tag{27}$$

Since EPS_1 is the product of the book value of firm's share and its return on equity (i.e., $\text{EPS}_1 = \text{ROE} \times B$), Equation (27) can be written as follows:

$$M = \frac{\text{ROE}(1-b)\,B}{k_e - g} \tag{28}$$

Dividing both sides of Equation (28) by B (book value per share), we obtain M/B equation as follows:

$$\frac{M}{B} = \frac{\text{ROE} - g}{k_e - g} \tag{29}$$

The time horizon, n may be assumed to be finite. Then Equation (29) becomes as follows:[12]

$$\frac{M}{B} = \left[\frac{\text{ROE} - g}{k_e - g}\right]\left[1 - \left(\frac{1+g}{1+k_e}\right)^n\right] + \left[\frac{1+g}{1+k_e}\right]^n \tag{30}$$

We can notice from Equation (29) or Equation (30) that the following are the determinants of the M/B ratio:

- ***Economic profitability or spread*** The magnitude of the spread between return on equity and the cost of equity, i.e., ROE – k_e determines the M/B ratio. The spread, sometimes referred to as the **economic profitability**, must be positive to create the shareholder value. The higher the positive spread, the higher the M/B ratio.
- ***Growth*** Growth depends on the firm's retention ratio (b) and the return on equity, (ROE). Given the firm's ROE, higher the retention ratio, higher will be the growth rate. However, a higher growth rate does not necessarily increase the shareholder value. It will accelerate the M/B ratio only when the return on equity is greater than the firm's cost of equity (ROE > k_e). Growth will have a negative effect on value if the cost of equity is more than the return on

12. W.E., *Financial Strategy*, Illinois' Richard D. Irwin, 1979, pp. 65–68.

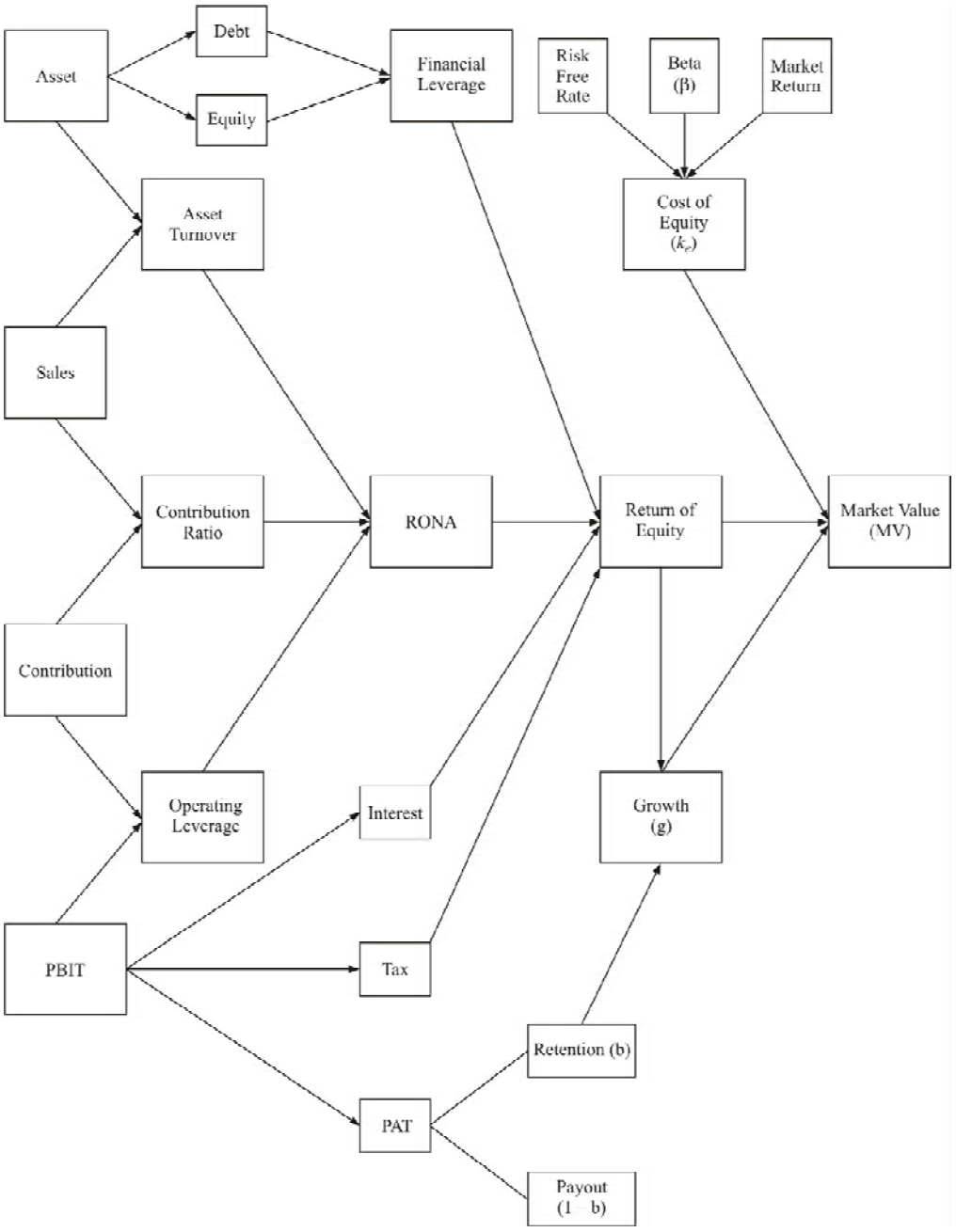


Figure 12.6: Growth and Value

equity (ROE > k_e). Thus, a firm should be economically profitable (i.e., ROE > k_e) for growth to be of value to the shareholders.[13] Growth is determined from the value perspective when the firm is economically unprofitable (i.e., ROE < k_{e-e}).

- ***Investment period*** The number of years over which the future investment will grow also determines the market value. In Equation (29), the time horizon, *n* is assumed infinite while Equation (30) assumes a finite time period.

Figure 12.6 shows the interaction between variables that leads to growth and the value of the firm's share. It can be seen from the figure that the connecting link between the sustainable growth model and the shareholder (market) value is the spread between the return on equity and the cost of equity. The firm's growth objective will be consistent with the shareholder value when this spread is positive.

13. *Ibid*.

NOTES

12.8.3 Economic Value Added (EVA)

Increasing MVA should be the objective of managers of firms. In large, publicly listed companies, the incentive compensations of top managers are linked to the share performance of their companies. In managers-owned or promoters-managed companies, the wealth of promoters and managers is directly related to the share performance. The incentives of top and other senior managers also depend on profits or related measures. Managers at operating and divisional levels do not have a direct control over market value. Their incentive compensations are mostly dependent on accounting measures like sales growth, cost reduction, profits or relative profitability measured return on investment, return on equity or earnings per share. Hence MVA or share performance-based measure cannot be used as a system of evaluating, motivating and incentivising managers at all management levels. Accounting-based measures can be directly related to the absolute performance and actions of managers and other employees. Accounting measures can be implemented at operating levels.

Accounting measures, like earnings or return on investment, however, have several problems:

1. They are based on arbitrary assumptions and policies and have scope for easy manipulability. Profits can be affected by changing depreciation methods, inventory valuations methods or allocating costs as revenue or capital expenditures without any change in true profitability.
2. They could motivate managers to take short-term decisions at the cost of long-term profitability of the company. Managers could reduce R&D expenditure or expenditure of building the staff capability to bolster short-term profitability. This would happen more in those companies where the compensations of managers are based on short-term earnings.
3. They do not reflect true profitability of the firm. Earnings are not cash flows. No distinction is made for the timing of earnings. Thus, earnings measures ignore time value of money and risk.
4. The most serious problem with accounting measures is that they might destroy shareholders' wealth. A manager can increase earnings by undertaking investment projects that have positive returns but negative net present value. In other words, these projects earn returns less than the cost of capital. They would increase earnings but destroy shareholders' wealth. Shareholders are not interested in growth in earnings rather they would like their wealth to increase through positive NPV projects.

We must recognise that although managers do not have a direct control over market value, but their actions influence the drivers of market value. Therefore, there is a need to identify a measure of performance that is related to value and that managers can directly observe and can see the influence of their actions over it. Even when accounting-based rates of return are used for performance evaluation, managers must consider the cost of capital. They must earn rates of return higher than the cost of capital. Suppose a firm's after-tax return on investment is 15 per cent. Its cost of capital is 12 per cent. The firm is earning a net return of 2 per cent. This is a value enhancing performance. On the other hand, if the firm could earn only 9 per cent return, its net return is negative 3 per cent and hence it is destroying value.

Economic value added (EVA^{TM})[14] is a measure which goes beyond the rate of return and considers the cost of capital as well. In its simple form, it measures earnings *after* the cost of capital. EVA calculation is based on the firm's financial statements with which managers are quite familiar. Let us consider an example.

Suppose a firm has total assets of Rs 55 crore. The shareholders' equity is Rs 30 crore and the cost of equity is 13 per cent. The firm's net earnings are given below:

14. EVA^{TM} is trade marked by the Stern-Steward consulting firm.

	(Rs in crore)
Sales	103.0
Less:	
Material costs	52.0
Wages and salaries	13.5
Depreciation	4.5
Power	7.0
Other manufacturing expenses	6.5
Administrative expenses	3.5
Selling and distribution expenses	6.0
Total expenses	93.0
Profit before interest and taxes (PBIT)	10.0
Less: Interest	2.5
Profit before taxes (PBT)	7.5
Less: Taxes	2.6
Profit after taxes (PAT)	4.9

The after-tax earnings available to shareholders are Rs 4.9 crore. This gives ROE of 4.9/30 = 16.3 per cent. The total rupee cost of the shareholders' equity is: Rs 30 crore × 0.13 = Rs 3.9 crore. There is a net gain of Rs 4.9 – Rs 3.9 = Rs 1.0 crore to shareholders when we consider the cost of their funds. The firm has been able to earn more than the minimum rate of return required by the shareholder; management has created the shareholder value. Shareholders have gained since the firm had earned more than Rs 3.9 crore. This is the cost of the shareholders' equity. If the cost of equity were, say, 18 per cent, shareholders' loss would have been Rs 4.9 – Rs 30 × 0.18 = – Rs 0.5 crore.

Economic value added, economic profit or **residual income** is defined as net earnings (PAT) in excess of the charges (cost) for shareholders' invested capital (equity):

$$\text{Economic value added} = \text{PAT} - \text{Charges for equity}$$
$$= \text{PAT} - \text{Cost of equity} \times \text{Equity capital} \quad (31)$$

The firm is said to have earned **economic return** (ER) if its return on equity (ROE) exceeds the cost of equity (COE):

$$\text{Economic return} = \text{ROE} - \text{COE} \quad (32)$$

In case of our example, ER is

$$\text{ER} = 0.163 - 0.13 = -0.033 \text{ or } 3.3\%$$

The economic return translates into EVA of: (0.163 – 0.13) × 30 = Rs 1.0 crore

EVA approach is founded on the same logic as the *M*/*B* approach. Both are based on the concept of economic profit as different from the accounting profit. In a divisionalised company, the separate information about the debt and equity may not be available. Hence there is a popular alternative way of calculating EVA in such situations as given below:

$$\text{Economic value added} = \text{Net operating profit after tax} - \text{Charges for capital employed}$$
$$\text{EVA} = \text{NOPAT} - \text{COCE}$$

NOPAT is profit after depreciation and taxes disregarding interest on debt. In other words, NOPAT is profit before interest and taxes (PBIT) minus tax without any adjustment for interest. It can also be calculated as profit after tax (PAT) plus after-tax interest. Thus:

$$\text{NOPAT} = \text{PBIT}(1-T) = \text{PAT} + \text{INT}(1-T) \quad (33)$$

As stated earlier, NOPAT is **ungeared** or **unlevered profit after tax** to service both lenders and shareholders.

For our example, NOPAT is as follows:

NOTES

	(Rs in crore)
PBIT	10.0
Less: Tax, 10 × 0.35	3.5
NOPAT, 10 (1 – 0.35)	6.5
Alternate Method:	
PAT	4.9
Plus: Interest	2.5
Less: Interest tax shield, 0.35 × Rs 2.5	–0.9
NOPAT, 4.9 + 2.5 (1 – 0.35)	6.5

Post-tax ROCE is the ratio of the net operating after tax (NOPAT) to invested capital (IC) or capital employed (CE):

$$\text{ROCE} = \frac{\text{NOPAT}}{\text{CE}} = \frac{\text{PBIT}(1-T)}{\text{CE}}$$

For our example, ROCE is:

$$\text{ROCE} = \frac{6.5}{55} = 0.118 \text{ or } 11.8\%$$

As we have already explained in earlier chapters, WACC is calculated as follows:

$$\text{WACC} = k_o = k_e\left(\frac{E}{V}\right) + k_d(1-T)\left(\frac{D}{V}\right)$$

The cost of equity in our example is 13 per cent. Suppose the cost of debt is 10 per cent. WACC in our example would be:

$$\text{WACC} = k_0 = 0.13\left(\frac{30}{55}\right) + 0.10\ (1-0.35)\left(\frac{25}{55}\right) = 0.10 \text{ or } 10\%$$

EVA can be calculated as the difference between ROCE and WACC multiplied by invested capital or capital employed:

$$\text{EVA} = (\text{ROCE} - \text{WACC}) \times \text{CE} \tag{34}$$

In our example, the EVA is: (0.118 – 0.100) × 55 = Rs 1.00 crore.

The economic value is added to shareholders whenever ROCE is higher than WACC (i.e., ROCE > WACC). The economic value will be destroyed if WACC exceeds ROCE (i.e., WACC > ROCE). EVA is net earnings in excess of the cost of capital supplied by lenders and shareholders. It represents the excess return (over and above the minimum required return) to shareholders; it is the net value added to shareholders.

EVA can be calculated for the firm as well as for the firm's divisions. We require calculation of the divisional cost of capital to determine divisional EVA. We have discussed earlier in this book the methodology for calculating the divisional cost of capital.

The advantages of EVA over the market-based and accounting-based measures of value creation are as follows:

1. EVA can be calculated for divisions and even projects.
2. EVA is a measure that gauges performance over a period of time rather than at a point of time. EVA is a **flow variable** and depends on the ongoing and future operations of the firm or divisions. MVA, on the other hand, is a **stock variable.**
3. EVA is not bound by the Generally Accepted Accounting Principles (GAAP). As we discuss below, appropriate adjustment are made to calculate EVA. This removes arbitrariness and scope for manipulations that is quite common in the accounting-based measures.
4. EVA is a measure of the firm's economic profit. Hence, it influences and is related to the firm's value.

NOTES

12.8.4 EVA Adjustments

EVA measures economic profit since it accounts for the cost of capital. However, it is still based on accounting information. Hence, to become a true measure of economic profit, the calculation of EVA needs refinements. The EVA approach assumes a refined standardised accounting system. Calculation of EVA requires appropriate changes in accounting policies and practices. A company might be required to make as many as over 150 adjustments in its reported profits to estimate EVA. However, there are only few critical adjustments, say 10 – 15, that are necessary for estimating EVA; others have minor effect. Some typical examples of the EVA accounting adjustments include the following:[15]

Impaired or non-performing assets Non-performing assets, (NPAs) as the name indicates, do not generate any earnings. Future value can be created only from the performing assets. Hence NPAs should be written off. If the asset's value is significantly impaired, and so too is the company's ability to extract economic business from it, the asset should be accordingly written down.

Research and development According to the US GAAP, companies can expense R&D expenditure as incurred. In India also, in some cases the capital expenditure on R&D is allowed to be expensed as incurred for tax purposes. R&D expenditure is an investment that is supposed to benefit the company in the future over long run. Hence it is more appropriate to capitalise R&D and other expenditures on intangibles like brands. There is yet another dimension to this. If R&D is expensed immediately, managers might tend to under-invest in R&D as it would show up as costs without any immediate corresponding benefits.

Deferred tax The timing differences between taxable income and book income causes deferred taxes. Accounting and tax depreciation causes deferred tax in most companies. Most companies in India use straight-line depreciation for reporting profit but they are required to use written down value method of depreciation for tax purposes. This difference normally results in more book profit than the taxable profit and hence a deferred tax liability. Deferred tax assets arise when companies make provisions for future costs that reduce current book profit. These assets are not tax deductible until companies spend the cash in a later period. Deferred taxes are non-cash costs; hence they should be ignored in calculating EVA.

Provisions Accounting is based on the concept of conservatism. Following GAAP, accountants make provisions for all future liabilities. The most common provisions include provision for bad and doubtful debts, guarantees, revaluation or restructuring. Provisions are non-cash items and a source of manipulating accounting profits. EVA calculation requires to profits to adjust for provisions and bring accounting profit closer to cash profit.

LIFO valuation of inventory In rising prices LIFO produces cost of goods sold figures that reflect current costs inventory. This is consistent with the matching of revenues and expenses. LIFO valuation under rising prices also saves tax as the cost of goods sold is higher than under alternative inventory valuation approaches. However, inventory value is understated and when this inventory is liquidated, profit and EVA are overstated.

Goodwill Goodwill is the difference between actual price paid for acquiring a company and the fair price of its assets and liabilities. This item is treated differently in different countries. The immediate write off of goodwill to reserves distorts true operating profit and invested capital. Any write-offs in the current year should be added to NOPAT. In India, the general practice is to write-off goodwill over a period of time, say, six years. This process also understates invested capital (although slowly) and true operating profits. Goodwill written off should be added to capital and profits.

Leases A lease is equivalent to secured borrowing. For accounting purposes the lease payments are treated as a rental expense, while the asset and debt might not appear on the balance sheet, particularly in the case of operating leases. This approach would understate the capital employed as lease is a substitute for debt. The capitalised value of lease should appear in the balance sheet.

15. Yound, S. David and O'Byrne, Stephen F., *EVA@ and Value-based Management: A Practical Guide to Implementation,* McGraw Hills, 2001, pp. 206–68.

NOTES

The borrowing rate should be applied to capitalised value of lease and necessary adjustment made in the interest income.

Restructuring charges Restructuring charges are investments for improving the future prospects of the business. Hence the EVA supporters argue that restructuring and other special charges should be capitalized.

12.8.5 Evaluation of M/B and EVA

Both *M*/*B* and EVA approaches focus on economic profitability rather than on accounting profitability. The *M*/*B* approach defines economic profitability as the spread between the return on equity and the cost of equity while in the popular version of EVA, it is the spread between the return on total capital and the cost of total capital. The spread in both approaches is same and it is value added to shareholders. From the accounting perspective, a firm is profitable if its return on equity is positive. However, from an economic perspective, the firm is profitable if the return on equity exceeds the cost of equity, or return on capital employed exceeds the over-all cost of the total capital employed. Hax and Majluf emphasise that:[16]

It is economic and not accounting profitability, that determines the capability of wealth creation on the part of the firm. It is perfectly possible that a company is in the black, and yet its market values is way below its book value, which means that, from economic point of view, its resources would be more profitable if deployed in an alternative investment of similar risk.

Both the approaches are an improvement over the traditional accounting measures of performance. But both do suffer from the limitation that they are partially based on accounting numbers. In the *M*/*B* approach, return on equity is an accounting number (profit after tax and book value of shareholders' investment) while the cost of equity is market determined. Similarly, the EVA approach uses the accounting-based net operating profit after tax while the cost of capital is market determined. Both return on equity and EVA are biased because they use accounting earnings (NOPAT or PAT) which are based on arbitrary assumptions, allocations and accounting policy changes. They also do not include changes in working capital and capital expenditures. Therefore, the measure of EVA is not equivalent to cash flow from operation, although with adjustments to accounting profit it comes closer to cash flows.

Check Your Progress

5. Define the 'Market Value Added' concept. How is it calculated?
6. What is Economic Value Added (EVA)? How is EVA calculated?
7. Identify the main financial value drivers that calculation of EVA helps a firm to identify.
8. What is meant by market value added?
9. What is meant by economic value added?
10. What are the advantages of EVA over other methods?
11. What are the basic financial value drivers to enhance value?

12.8.6 Value Drivers

What are the drivers of EVA or value based on the discounted cash flow approach? What generic strategies can be pursued by a firm to create shareholder value? EVA depends on revenue, costs, taxes and cost of capital. Similarly, cash flows under the DCF valuation depend on these same factors plus changes in working capital and capital expenditure over a given time horizon. Thus, the following are the financial value drivers or generic strategies to enhance value:[17]

- ***Revenue enhancement*** The firm can increase its revenue by improving its market share and/or increasing the price of the product. The strategies needed to do so include creating barriers like patents, product differentiation, monopoly power etc.
- ***Cost reduction*** The firm can become a cost leader by lowering its costs beneath that of its competitors through economies of scale, vertical integration, or captive sources of material.
- ***Asset utilisation*** The firm can improve its profitability by reducing its capital intensity through improved utilisation of its assets.
- ***Cost of capital reduction*** The firm can design debt and equity securities that appeal to special niche of capital markets and thereby attract cheaper funds. It can reduce its business risk and design a capital structure that minimises the overall cost of capital by increasing interest tax shield without much increase in financial risk.

16. Hax, A.C. and Majluf, N.S., *Strategic Management,* New Jersey, Prentice-Hall, Inc., pp. 214–15.
17. Hax and Majluf, *op. cit.*, Fruhan, *op. cit.*

NOTES

12.9 SHAREHOLDER VALUE ANALYSIS: CASE OF CADILA HEALTHCARE COMPANY

CHL is the flagship company of Zydus group in Ahmedabad. It is a leading integrated pharmaceutical company in India. In the domestic formulations market, it is ranked as number five with a market share of 3.85 per cent. It is one of the principal players of complex bulk drugs. One-fourth of the company's revenue comes from exports and 80 per cent from the domestic business. It aims to be a leading global generic player by the end of this decade.

CHL has stated its vision as follows:[18]

- One of India's leading healthcare players, we aim to be global-research driven by 2020.
- We shall achieve sales of $ 400 million by 2006.
- We shall be top ten global generics company with a strong R&D pipeline and sales in excess of $ 1 billion by 2010.

The company has expressed its vision in terms of competitive excellence through R&D and sales growth and size. The mission of the company is articulated in the following words: "We are dedicated to life…in all its dimensions. Our world is shaped by a passion for innovation, commitment to partners and concern for people in an effort to create healthier communities, globally." Table 12.10 provides the company's 5-year performance.

Table 12.10: Cadila Healthcare Company's Performance

	2000	*2001*	*2002*	*2003*	*2004*
Sales (Rs cr.)	4,778	5,088	5,888	10,282	11,723
Assets turnover	0.57	0.74	0.61	0.86	0.92
PBDIT/sales	15.2%	16.6%	17.0%	18.7%	21.2%
ROCE	8.7%	12.2%	10.4%	16.1%	19.5%
D/E	0.47	0.10	0.49	1.01	0.77
ROE	7.7%	12.1%	12.2%	17.4%	27.2%
EPS	6.28	10.97	11.27	12.2	22.75
DPS	2.32	3.00	3.50	3.50	6.00
Payout	36.9%	27.3%	31.1%	28.7%	26.4%
Book value per share	82.70	91.20	92.60	69.90	83.50
Market value per share	130.00	127.95	130.05	123.50	454.20
M/B	1.57	1.40	1.40	1.77	5.44

Source: Annual report 2003-04

How has CHC performed? The company's sales have increased from Rs 4,778 crore in 2000 to Rs 11,723 at a compound growth rate of 25 per cent per annum. The company's ROCE and ROE have increased over the years. It retains almost three-fourths of its profits and debt-equity ratio is less than 1, which implies higher capital stake of shareholders. In spite of low payout, earnings per share and dividend per share are increasing as the company's profits are growing.

Has CHC been able to convert its high profitability and growth into higher value for shareholders? The company believes in adding value to shareholders. CHC's market value of equity and debt showed tremendous increase in 2004 and the market value added increased from Rs 3,196 crore to Rs 23,278 crore (Table 35 .2). As a per cent of invested capital or capital employed market value added increased from 36 per cent in 2003 to 250 per cent in 2004 – almost seven fold increase.

18. Annual Report 2003–04.

NOTES

Table 12.11: CHC's Market Value Added

(Rs in crore)	*2003*	*2004*
Market value of equity (*E*)	7,586	28,525
Market value of debt (*D*)	4,429	4,057
Value of equity & debt (*V*)	12,015	32,582
Less: Capital employed (*CE*)	8,819	9,304
Market value added (MVA)	3,196	23,278
MVA/V	26.6%	71.4%
MVA/CE	36.2%	250.2%

Table 12.12 shows CHC's EVA for 2003 and 2004. The after-tax cost of debt was 8.3 per cent in 2003 and 5.7 per cent in 2004. The cost of equity is calculated using the capital asset price model (CAPM). The risk-free rate is taken as the yield on 10-year long-term government bonds. The risk-premium is 7 per cent and beta of 0.70. The weighted average cost of capital was 10.4 per cent in 2003 and 9.70 per cent in 2004. CHC uses market value weights in calculating WACC. The reduction in WACC occurred because of the decrease in the post-tax cost of debt.

Table 12.12: CHC's EVA

(Rs in crore)	*2003*	*2004*
Cost of Capital		
Equity (E)	4,390	5,247
Debt (D)	4,429	4,057
Capital employed (CE)	8,819	9,304
Post-tax cost of debt	8.30%	5.70%
Cost of equity	11.60%	10.60%
WACC (market value weights)	10.40%	9.70%
Economic Value Added		
EBIT	1,489	1,837
Less: Taxes (adjusted for interest tax shield)	116	100
NOPAT	1,372	1,737
Cost of capital employed	948	883
Economic value added (EVA)	424	854
EVA/CE (%)	4.8%	9.2%

CHC's EVA performance 2004 doubled as compared to 2003; it increased from Rs 424 crore to Rs 854 crore. EVA as a per cent of capital employed was 4.8 per cent in 2003 which increased to 9.2 per cent in 2004. The enhanced EVA performance of the company is reflected in the high market value of the company's share that has increased from Rs 123 per share in 2003 to Rs 454 per share in 2004. The market value-to-book value ratio increased from 1.54 in 2003 to 5.44 in 2004 (Table 12.11).

Table 12.13: CHC: Drivers of EVA

		2003	*2004*
Sales/assets	Assets turnover	0.86	0.92
PBIT/sales	Margin	15.0%	16.7%
PBIT/assets	ROI	12.9%	15.3%
Assets/net worth	Capital Leverage	2.72	2.43
PAT/PBIT	Income Leverage	49.7%	73.0%
(A/NW) × (PAT/PBIT)	Leverage factor	1.35	1.78
PAT/NW	ROE	17.4%	27.2%
$R_{f+} R_p \times \beta$	Cost of equity	11.6%	10.6%
ER = ROE – COE	Economic return or EVA %	5.8%	16.6%

Table 12.13 shows EVA analysis in terms of return on equity and cost of equity, and traces the financial drivers of CHC's higher EVA in 2004. The higher EVA in 2004 was caused by increase in assets productivity (assets turnover ratio), better margin, resulting from cost reduction, increased leverage factor and lower cost of equity. The company used less borrowing but was able to save on interest payment and taxes which enhanced the leverage factor. The reduction in financial risk and reduced interest rates caused the cost of equity to fall.

12.10 MANAGERIAL IMPLICATIONS OF SHAREHOLDER VALUE

The shareholder value approach is based on the assumption that a principal-agent relationship exists between the shareholders and the management. As shareholders' agent, management is charged with the responsibility of creating wealth for shareholders. Therefore, all management actions and strategies should be guided by SVC. The foundation of SVC is the notion that the shareholder value depends on future cash flows and their risk. The cost of capital, accounting for the timing and risk of future cash flows, is used to determine the present value of cash flows. We should note that SVC emphasises the present value of future cash flows rather than earnings. Earnings suffer from accounting policy biases and subjectivism. They are not directly linked to value.

SVC takes a long-term perspective and focuses on valuation. A number of companies in India use the DCF analysis to evaluate projects. They accept those projects which are expected to generate internal rate of return higher than the cost of capital, or a positive net present value of future cash flows when discounted at the cost of capital. More and more corporate managers now realise the strong need for the extensive adoption of SVC in evaluating all management actions, projects, business strategies and overall strategic planning. SVC can be used to evaluate the consequences of strategies pursued by the company. At the business unit or division level, it is used to evaluate the alternative competitive strategies, to identify the key business factors that impact SVC and to set performance targets that are consistent with value creation. At the corporate level, it is used to evaluate the contribution of the strategies followed by business units/divisions, to form strategic combinations of businesses that will create maximum value, to identify products or businesses for divestiture and to mergers and acquisition activities.

The following steps are involved in using SVC based on DCF approach for strategic analysis and planning:

- Evaluate the current position of each division assuming that there will not be any significant changes from the current strategy.
- Estimate the business unit's net operating cash flows from the current strategy over the planning horizon; make explicit assumptions about sales growth, operating profit margin, tax rate, changes in working capital and additional capital expenditure needed to sustain the existing strategies.
- Estimate the unlevered cost of capital (k_u) of the business unit. The unlevered beta of an independent company similar to the business unit can be used for calculating the business unit's cost of capital.
- Estimate the terminal or the residual value of post-planning period. Make appropriate assumption about the post-planning growth of cash flows keeping in mind the nature of competition.
- Calculate the present value of net operating cash flows and terminal value at the cost of capital.
- Calculate the present value of interest tax shield at the cost of debt. If the amount of debt is not directly observable, then use the debt ratio of similar independent firms to determine the business unit's amount of debt.
- Add the present values of net operating cash flows, terminal value and interest tax shield to obtain the total value of the business.

NOTES

- Subtract the value of debt from the total value to calculate the shareholder value.
- Repeat the above mentioned steps to calculate the shareholder value if the business unit follows a new strategy.
- The difference between the shareholder value of the current strategy and the new strategy is the value created (or destroyed). Go for new strategy if a positive value is created for the shareholder.
- Strategic plans of all business units should be integrated into the corporate strategic plan. SVC approach should be utilised to exploit the synergy between various units. The focus should be on maximising the overall shareholder value rather than treating business units as absolutely autonomous and working at cross purposes.

DCF approach is easily amenable for evaluating long-term projects and business strategies. However, tracking the operating performance more frequently, EVA approach is operationally more feasible. EVA, after making appropriate adjustments, is closer to cash flows. It is the experience of a large number of adopters of EVA that higher EVA leads to higher market value of shares.

The SVC approach helps to strengthen the competitive position of the firm by focusing on wealth creation. It provides an objective and consistent framework of evaluation and decision-making across all functions, departments and units of the firm. It can be easily implemented since cash flow data can be obtained by suitably adapting the firm's existing system of financial projection and planning. The only additional input needed is the cost of capital. The adoption of the SVC approach does require a change of the mind-set and educating managers about the shareholder value approach and its implementation.

12.11 LET US SUMMARIZE

- ❖ In practice, financial policy of a company is closely linked with its corporate strategy. A firm's strategy establishes an effective and efficient match between its competences and opportunities and environmental risks. It provides a mechanism integrating the goals of its multiple consistencies. Financial policies of the firms should be developed in context of its corporate strategy.
- ❖ Within the overall framework of the firm's strategy, there should be consistency between financial policies—investment, debt and dividend. For example, a firm can sustain a high-growth strategy only when its investment projects generate high profits and it follows a policy of low payout and high debt.
- ❖ Growth should lead to the enhancement of the shareholder value. This will happen when the firm is economically profitable; that is, when the firm's return on equity (ROE) is higher than its cost of equity (k_e). Value is created when ROE > k_e; value is maintained when ROE = k_e; and value is destroyed when ROE < k_e. Alternatively, ROCE can be compared with WACC. Value is created when ROCE > WACC.
- ❖ The amount of EVA is the difference between after-tax PBIT and the charges for capital employed or invested capital:

$$EVA = PBIT\,(1 - T) - WACC \times CE$$

12.12 KEY CONCEPTS

Agency theory	Ungeared earnings	Economic return
Economic profit	Economic value added (EVA)	Fisher's separation theorem
Information signalling	Residual income	Shareholder value
Strategic planning	Strategy	Sustainable growth

Check Your Progress

12. Differentiate between the EVA approach and DCF analysis approach to evaluate businesses.

12.13 ANSWERS TO 'CHECK YOUR PROGRESS'

NOTES

1. The two measures of dispersion (or variability of returns) are variance or standard deviation. Standard deviation is the square root of variance.
2. The main models for valuing portfolio risks are capital asset pricing model (CAPM) and arbitrage pricing theory (APT).
3. Total risk of an individual security consists of two parts: systematic risk and unsystematic risk. Systematic risk arises on account of economy wide uncertainties and the tendency of individual securities to move together with changes in the market. This part of the risk cannot be diversified and is also known as market risk. On the other hand, unsystematic risk arises from the unique uncertainties of individual securities. These uncertainties are diversifiable if a large number of securities are combined to form well diversified portfolios.
4. Financial goals are the quantitative expressions of a company's strategy. During a company's life cycle, objectives of growth and return could change. Depending upon the overall strategy, important financial goals for corporate managers usually include: ensuring fund availability, maximising growth, maximising operating profit before interest and taxes, and return on investment. During recent years, more and more companies are focusing on shareholder value creation.
5. A firm should seek to maximise shareholder value. Market value of a firm's shares is a measurement of the shareholders' wealth. The capital contributed by shareholders is reflected by the book value of the firm's shares. Hence, shareholder value creation may be defined as the excess of market value over book value. Therefore Market Value Added (MVA) = Market Value – Invested Capital. However, Invested Capital is at historical value. Hence we need to modify the equation and use the 'economic value' of the invested capital for our calculation.
6. EVA is defined as net earnings (PAT) in excess of the charges (cost) for shareholders' invested capital or equity. This basically means that EVA measures earnings after the cost of capital has been taken into account. EVA = Net Operating Profit After Tax (NOPAT) – Charges for Capital Employed (COCE).
7. The main financial value drivers or generic strategies to enhance value and hence EVA include: (i) revenue enhancement; (ii) cost reduction, (iii) better asset utilisation, and (iv) cost of capital reduction.
8. Market value added can be defined as the excess of market value over book value of a firm.
9. Economic value added can be defined as the excess of Net operating profits after Tax over firm's weighted cost of capital.
10. (a) EVA can be calculated for division or even projects.
    (b) EVA is a measure that measures the performance over a period of time.
    (c) EVA is not bound by generally accepted accounting principles.
11. (a) Revenue enhancement
    (b) Cost reduction
    (c) Asset utilization
    (d) Cost of capital reductions
12. Traditionally, companies have used the DCF techniques (IRR and NPV) to evaluate projects. However, more and more corporate mangers have started adopting the EVA concept in evaluating all management decisions including project evaluation, business strategies and overall strategic planning. The DCF approach is easily amenable for evaluating long-term projects and business strategies. Hence, companies have started using the Shareholder Value Creation (SVC) approach based on the DCF approach for strategic analysis and planning.

NOTES

12.14 QUESTIONS AND EXERCISES

Review Questions

1. Describe the interface between financial policies and corporate strategy.
2. What is sustainable growth rate? What factors determine it?
3. What is shareholder value analysis? What relationship exists between growth, economic profitability and the shareholder value?
4. Define MVA? How is it calculated? What are its pros and cons?
5. What is economic value added? How is it calculated?
6. What are the advantages and disadvantages of economic value added? Is it a superior method of performance evaluation than return on capital employed? How?

Exercises

1. The following are the financial statements of Macro Company Limited for the year 2004:

Capital & Liabilities	*Rs (lakh)*	*Assets*	*Rs (lakh)*
Creditors	7,500	Cash	15,000
Borrowings	35,000	Inventory	18,000
Paid-up share capital	25,000	Debtors	6,000
Reserve & surplus	26,500	Net fixed assets	55,000
	94,000		94,000
Profit & Loss			
Sales			43,000
Gross profit			31,000
PBIT			3,500
PBT			27,500
PAT			24,875

   Calculate sustainable growth rate for Macro Company Limited.

2. A firm has grown at 15 per cent in the past few years. Its after-tax ROI and after-tax interest rate have been, respectively, 16 per cent and 7 per cent. It now has a target growth rate of 18 per cent. The company expects its profitability and interest cost to remain constant and maintain its payout ratio at 60 per cent. How can the firm achieve its target growth? Show calculations.
3. A manufacturing company earned PAT of Rs 123 crore in 2004 paying interest of Rs 24 crore. The company's invested capital is Rs 1,340 crore and WACC 15 per cent. Calculate the company's EVA?
4. ***Infosys*** Table 12.14 provides certain financial data for Infosys from year 1999 to year 2003. The company uses CAPM to calculate cost of equity. You are required to calculate the following: (*i*) MVA, (*ii*) EVA, (*iii*) M/B and (*iv*) Economic Return. Comment on the company's market performance.

NOTES

Table 12.14: Infosys: Economic Value Added Analysis

	2003	***2002***	***2001***	***2000***	***1999***
Average capital employed (Rs in crore)	2,470.48	1,734.97	1,111.47	703.87	245.42
Average debt/total capital (%)	—	—	—	—	—
Beta variant	1.57	1.41	1.54	1.48	1.48
Risk-free debt cost (%)	6.00	7.30	10.30	10.45	12.00
Market premium	7.00	7.00	7.00	8.00	9.00
PBT (excluding extraordinary income)	1,158.93	943.39	696.03	325.65	155.86
Tax	201.00	135.43	72.71	39.70	22.94
Enterprise value (Rs in crore)					
Market value of equity	26,847.33	24,654.33	26,926.35	59,338.17	9,672.80
Less: Cash and cash equivalents	1,638.51	1,026.96	577.74	508.37	416.66
Add: Debt	—	—	—	—	—
Enterprise value	25,208.82	23,627.37	26,348.61	58,829.80	9,256.14

ANNEXURE

Table A: Compound Value Factor of a Lump Sum (CVF) of Re 1

	Interest Rate													
Year	***1%***	***2%***	***3%***	***4%***	***5%***	***6%***	***7%***	***8%***	***9%***	***10%***	***11%***	***12%***	***13%***	***14%***
1	1.010	1.020	1.030	1.040	1.050	1.060	1.070	1.080	1.090	1.100	1.110	1.120	1.130	1.140
2	1.020	1.040	1.061	1.082	1.103	1.124	1.145	1.166	1.188	1.210	1.232	1.254	1.277	1.300
3	1.030	1.061	1.093	1.125	1.158	1.191	1.225	1.260	1.295	1.331	1.368	1.405	1.443	1.482
4	1.041	1.082	1.126	1.170	1.216	1.262	1.311	1.360	1.412	1.464	1.518	1.574	1.630	1.689
5	1.051	1.104	1.159	1.217	1.276	1.338	1.403	1.469	1.539	1.611	1.685	1.762	1.842	1.925
6	1.062	1.126	1.194	1.265	1.340	1.419	1.501	1.587	1.677	1.772	1.870	1.974	2.082	2.195
7	1.072	1.149	1.230	1.316	1.407	1.504	1.606	1.714	1.828	1.949	2.076	2.211	2.353	2.502
8	1.083	1.172	1.267	1.369	1.477	1.594	1.718	1.851	1.993	2.144	2.305	2.476	2.658	2.853
9	1.094	1.195	1.305	1.423	1.551	1.689	1.838	1.999	2.172	2.358	2.558	2.773	3.004	3.252
10	1.105	1.219	1.344	1.480	1.629	1.791	1.967	2.159	2.367	2.594	2.839	3.106	3.395	3.707
11	1.116	1.243	1.384	1.539	1.710	1.898	2.105	2.332	2.580	2.853	3.152	3.479	3.836	4.226
12	1.127	1.268	1.426	1.601	1.796	2.012	2.252	2.518	2.813	3.138	3.498	3.896	4.335	4.818
13	1.138	1.294	1.469	1.665	1.886	2.133	2.410	2.720	3.066	3.452	3.883	4.363	4.898	5.492
14	1.149	1.319	1.513	1.732	1.980	2.261	2.579	2.937	3.342	3.797	4.310	4.887	5.535	6.261
15	1.161	1.346	1.558	1.801	2.079	2.397	2.759	3.172	3.642	4.177	4.785	5.474	6.254	7.138
16	1.173	1.373	1.605	1.873	2.183	2.540	2.952	3.426	3.970	4.595	5.311	6.130	7.067	8.137
17	1.184	1.400	1.653	1.948	2.292	2.693	3.159	3.700	4.328	5.054	5.895	6.866	7.986	9.276
18	1.196	1.428	1.702	2.026	2.407	2.854	3.380	3.996	4.717	5.560	6.544	7.690	9.024	10.575
19	1.208	1.457	1.754	2.107	2.527	3.026	3.617	4.316	5.142	6.116	7.263	8.613	10.197	12.056
20	1.220	1.486	1.806	2.191	2.653	3.207	3.870	4.661	5.604	6.727	8.062	9.646	11.523	13.743
25	1.282	1.641	2.094	2.666	3.386	4.292	5.427	6.848	8.623	10.835	13.585	17.000	21.231	26.462
30	1.348	1.811	2.427	3.243	4.322	5.743	7.612	10.063	13.268	17.449	22.892	29.960	39.116	50.950
40	1.489	2.208	3.262	4.801	7.040	10.286	14.974	21.725	31.409	45.259	65.001	93.051	132.782	188.884
50	1.645	2.692	4.384	7.107	11.467	18.420	29.457	46.902	74.358	117.391	184.565	289.002	450.736	700.233

(Contd..)

Table A Contd.

	Interest Rate												
Year	***15%***	***16%***	***17%***	***18%***	***19%***	***20%***	***21%***	***22%***	***23%***	***24%***	***25%***	***30%***	***40%***
1	1.150	1.160	1.170	1.180	1.190	1.200	1.210	1.220	1.230	1.240	1.250	1.300	1.400
2	1.323	1.346	1.369	1.392	1.416	1.440	1.464	1.488	1.513	1.538	1.563	1.690	1.960
3	1.521	1.561	1.602	1.643	1.685	1.728	1.772	1.816	1.861	1.907	1.953	2.197	2.744
4	1.749	1.811	1.874	1.939	2.005	2.074	2.144	2.215	2.289	2.364	2.441	2.856	3.842
5	2.011	2.100	2.192	2.288	2.386	2.488	2.594	2.703	2.815	2.932	3.052	3.713	5.378
6	2.313	2.436	2.565	2.700	2.840	2.986	3.138	3.297	3.463	3.635	3.815	4.827	7.530
7	2.660	2.826	3.001	3.185	3.379	3.583	3.797	4.023	4.259	4.508	4.768	6.275	10.541
8	3.059	3.278	3.511	3.759	4.021	4.300	4.595	4.908	5.239	5.590	5.960	8.157	14.758
9	3.518	3.803	4.108	4.435	4.785	5.160	5.560	5.987	6.444	6.931	7.451	10.604	20.661
10	4.046	4.411	4.807	5.234	5.695	6.192	6.727	7.305	7.926	8.594	9.313	13.786	28.925
11	4.652	5.117	5.624	6.176	6.777	7.430	8.140	8.912	9.749	10.657	11.642	17.922	40.496
12	5.350	5.936	6.580	7.288	8.064	8.916	9.850	10.872	11.991	13.215	14.552	23.298	56.694
13	6.153	6.886	7.699	8.599	9.596	10.699	11.918	13.264	14.749	16.386	18.190	30.288	79.371
14	7.076	7.988	9.007	10.147	11.420	12.839	14.421	16.182	18.141	20.319	22.737	39.374	111.120
15	8.137	9.266	10.539	11.974	13.590	15.407	17.449	19.742	22.314	25.196	28.422	51.186	155.568
16	9.358	10.748	12.330	14.129	16.172	18.488	21.114	24.086	27.446	31.243	35.527	66.542	217.795
17	10.761	12.468	14.426	16.672	19.244	22.186	25.548	29.384	33.759	38.741	44.409	86.504	304.913
18	12.375	14.463	16.879	19.673	22.901	26.623	30.913	35.849	41.523	48.039	55.511	112.455	426.879
19	14.232	16.777	19.748	23.214	27.252	31.948	37.404	43.736	51.074	59.568	69.389	146.192	597.630
20	16.367	19.461	23.106	27.393	32.429	38.338	45.259	53.358	62.821	73.864	86.736	190.050	836.683
25	32.919	40.874	50.658	62.669	77.388	95.396	117.391	144.210	176.859	216.542	264.698	705.641	4499.880
30	66.212	85.850	111.065	143.371	184.675	237.376	304.482	389.758	497.913	634.820	807.794	2619.996	24201.432
40	267.864	378.721	533.869	750.378	1051.668	1469.772	2048.400	2847.038	3946.430	5455.913	7523.164	36118.865	700037.697
50	1083.657	1670.704	2566.215	3927.357	5988.914	9100.438	13780.612	20796.561	31279.195	46890.435	70064.923	497929.223	20248916.240

Table B: Compound Value Factor of an Annuity (CVFA) of Re 1

	Interest Rate													
Year	***1%***	***2%***	***3%***	***4%***	***5%***	***6%***	***7%***	***8%***	***9%***	***10%***	***11%***	***12%***	***13%***	***14%***
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2	2.010	2.020	2.030	2.040	2.050	2.060	2.070	2.080	2.090	2.100	2.110	2.120	2.130	2.140
3	3.030	3.060	3.091	3.122	3.153	3.184	3.215	3.246	3.278	3.310	3.342	3.374	3.407	3.440
4	4.060	4.122	4.184	4.246	4.310	4.375	4.440	4.506	4.573	4.641	4.710	4.779	4.850	4.921
5	5.101	5.204	5.309	5.416	5.526	5.637	5.751	5.867	5.985	6.105	6.228	6.353	6.480	6.610
6	6.152	6.308	6.468	6.633	6.802	6.975	7.153	7.336	7.523	7.716	7.913	8.115	8.323	8.536
7	7.214	7.434	7.662	7.898	8.142	8.394	8.654	8.923	9.200	9.487	9.783	10.089	10.405	10.730
8	8.286	8.583	8.892	9.214	9.549	9.897	10.260	10.637	11.028	11.436	11.859	12.300	12.757	13.233
9	9.369	9.755	10.159	10.583	11.027	11.491	11.978	12.488	13.021	13.579	14.164	14.776	15.416	16.085
10	10.462	10.950	11.464	12.006	12.578	13.181	13.816	14.487	15.193	15.937	16.722	17.549	18.420	19.337
11	11.567	12.169	12.808	13.486	14.207	14.972	15.784	16.645	17.560	18.531	19.561	20.655	21.814	23.045
12	12.683	13.412	14.192	15.026	15.917	16.870	17.888	18.977	20.141	21.384	22.713	24.133	25.650	27.271
13	13.809	14.680	15.618	16.627	17.713	18.882	20.141	21.495	22.953	24.523	26.212	28.029	29.985	32.089
14	14.947	15.974	17.086	18.292	19.599	21.015	22.550	24.215	26.019	27.975	30.095	32.393	34.883	37.581
15	16.097	17.293	18.599	20.024	21.579	23.276	25.129	27.152	29.361	31.772	34.405	37.280	40.417	43.842
16	17.258	18.639	20.157	21.825	23.657	25.673	27.888	30.324	33.003	35.950	39.190	42.753	46.672	50.980
17	18.430	20.012	21.762	23.698	25.840	28.213	30.840	33.750	36.974	40.545	44.501	48.884	53.739	59.118
18	19.615	21.412	23.414	25.645	28.132	30.906	33.999	37.450	41.301	45.599	50.396	55.750	61.725	68.394
19	20.811	22.841	25.117	27.671	30.539	33.760	37.379	41.446	46.018	51.159	56.939	63.440	70.749	78.969
20	22.019	24.297	26.870	29.778	33.066	36.786	40.995	45.762	51.160	57.275	64.203	72.052	80.947	91.025
25	28.243	32.030	36.459	41.646	47.727	54.865	63.249	73.106	84.701	98.347	114.413	133.334	155.620	181.871
30	34.785	40.568	47.575	56.085	66.439	79.058	94.461	113.283	136.308	164.494	199.021	241.333	293.199	356.787
40	48.886	60.402	75.401	95.026	120.800	154.762	199.635	259.057	337.882	442.593	581.826	767.091	1013.704	1342.025
50	64.463	84.579	112.797	152.667	209.348	290.336	406.529	573.770	815.084	1163.909	1668.771	2400.018	3459.507	4994.521

(Contd..)

Table B Contd.

	Interest Rate												
Year	***15%***	***16%***	***17%***	***18%***	***19%***	***20%***	***21%***	***22%***	***23%***	***24%***	***25%***	***30%***	***40%***
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2	2.150	2.160	2.170	2.180	2.190	2.200	2.210	2.220	2.230	2.240	2.250	2.300	2.400
3	3.473	3.506	3.539	3.572	3.606	3.640	3.674	3.708	3.743	3.778	3.813	3.990	4.360
4	4.993	5.066	5.141	5.215	5.291	5.368	5.446	5.524	5.604	5.684	5.766	6.187	7.104
5	6.742	6.877	7.014	7.154	7.297	7.442	7.589	7.740	7.893	8.048	8.207	9.043	10.946
6	8.754	8.977	9.207	9.442	9.683	9.930	10.183	10.442	10.708	10.980	11.259	12.756	16.324
7	11.067	11.414	11.772	12.142	12.523	12.916	13.321	13.740	14.171	14.615	15.073	17.583	23.853
8	13.727	14.240	14.773	15.327	15.902	16.499	17.119	17.762	18.430	19.123	19.842	23.858	34.395
9	16.786	17.519	18.285	19.086	19.923	20.799	21.714	22.670	23.669	24.712	25.802	32.015	49.153
10	20.304	21.321	22.393	23.521	24.709	25.959	27.274	28.657	30.113	31.643	33.253	42.619	69.814
11	24.349	25.733	27.200	28.755	30.404	32.150	34.001	35.962	38.039	40.238	42.566	56.405	98.739
12	29.002	30.850	32.824	34.931	37.180	39.581	42.142	44.874	47.788	50.895	54.208	74.327	139.235
13	34.352	36.786	39.404	42.219	45.244	48.497	51.991	55.746	59.779	64.110	68.760	97.625	195.929
14	40.505	43.672	47.103	50.818	54.841	59.196	63.909	69.010	74.528	80.496	86.949	127.913	275.300
15	47.580	51.660	56.110	60.965	66.261	72.035	78.330	85.192	92.669	100.815	109.687	167.286	386.420
16	55.717	60.925	66.649	72.939	79.850	87.442	95.780	104.935	114.983	126.011	138.109	218.472	541.988
17	65.075	71.673	78.979	87.068	96.022	105.931	116.894	129.020	142.430	157.253	173.636	285.014	759.784
18	75.836	84.141	93.406	103.740	115.266	128.117	142.441	158.405	176.188	195.994	218.045	371.518	1064.697
19	88.212	98.603	110.285	123.414	138.166	154.740	173.354	194.254	217.712	244.033	273.556	483.973	1491.576
20	102.444	115.380	130.033	146.628	165.418	186.688	210.758	237.989	268.785	303.601	342.945	630.165	2089.206
25	212.793	249.214	292.105	342.603	402.042	471.981	554.242	650.955	764.605	898.092	1054.791	2348.803	11247.199
30	434.745	530.312	647.439	790.948	966.712	1181.882	1445.151	1767.081	2160.491	2640.916	3227.174	8729.985	60501.081
40	1779.090	2360.757	3134.522	4163.213	5529.829	7343.858	9749.525	12936.535	17154.046	22728.803	30088.655	120392.883	1750091.741
50	7217.716	10435.649	15089.502	21813.094	31515.336	45497.191	65617.202	94525.279	135992.154	195372.644	280255.693	1659760.743	50622288.099

Table C: Present Value Factor of a Lump Sum (PVF) of Re 1

	Interest Rate													
Year	***1%***	***2%***	***3%***	***4%***	***5%***	***6%***	***7%***	***8%***	***9%***	***10%***	***11%***	***12%***	***13%***	***14%***
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909	0.901	0.893	0.885	0.877
2	0.980	0.961	0.943	0.925	0.907	0.890	0.873	0.857	0.842	0.826	0.812	0.797	0.783	0.769
3	0.971	0.942	0.915	0.889	0.864	0.840	0.816	0.794	0.772	0.751	0.731	0.712	0.693	0.675
4	0.961	0.924	0.888	0.855	0.823	0.792	0.763	0.735	0.708	0.683	0.659	0.636	0.613	0.592
5	0.951	0.906	0.863	0.822	0.784	0.747	0.713	0.681	0.650	0.621	0.593	0.567	0.543	0.519
6	0.942	0.888	0.837	0.790	0.746	0.705	0.666	0.630	0.596	0.564	0.535	0.507	0.480	0.456
7	0.933	0.871	0.813	0.760	0.711	0.665	0.623	0.583	0.547	0.513	0.482	0.452	0.425	0.400
8	0.923	0.853	0.789	0.731	0.677	0.627	0.582	0.540	0.502	0.467	0.434	0.404	0.376	0.351
9	0.914	0.837	0.766	0.703	0.645	0.592	0.544	0.500	0.460	0.424	0.391	0.361	0.333	0.308
10	0.905	0.820	0.744	0.676	0.614	0.558	0.508	0.463	0.422	0.386	0.352	0.322	0.295	0.270
11	0.896	0.804	0.722	0.650	0.585	0.527	0.475	0.429	0.388	0.350	0.317	0.287	0.261	0.237
12	0.887	0.788	0.701	0.625	0.557	0.497	0.444	0.397	0.356	0.319	0.286	0.257	0.231	0.208
13	0.879	0.773	0.681	0.601	0.530	0.469	0.415	0.368	0.326	0.290	0.258	0.229	0.204	0.182
14	0.870	0.758	0.661	0.577	0.505	0.442	0.388	0.340	0.299	0.263	0.232	0.205	0.181	0.160
15	0.861	0.743	0.642	0.555	0.481	0.417	0.362	0.315	0.275	0.239	0.209	0.183	0.160	0.140
16	0.853	0.728	0.623	0.534	0.458	0.394	0.339	0.292	0.252	0.218	0.188	0.163	0.141	0.123
17	0.844	0.714	0.605	0.513	0.436	0.371	0.317	0.270	0.231	0.198	0.170	0.146	0.125	0.108
18	0.836	0.700	0.587	0.494	0.416	0.350	0.296	0.250	0.212	0.180	0.153	0.130	0.111	0.095
19	0.828	0.686	0.570	0.475	0.396	0.331	0.277	0.232	0.194	0.164	0.138	0.116	0.098	0.083
20	0.820	0.673	0.554	0.456	0.377	0.312	0.258	0.215	0.178	0.149	0.124	0.104	0.087	0.073
25	0.780	0.610	0.478	0.375	0.295	0.233	0.184	0.146	0.116	0.092	0.074	0.059	0.047	0.038
30	0.742	0.552	0.412	0.308	0.231	0.174	0.131	0.099	0.075	0.057	0.044	0.033	0.026	0.020
40	0.672	0.453	0.307	0.208	0.142	0.097	0.067	0.046	0.032	0.022	0.015	0.011	0.008	0.005
50	0.608	0.372	0.228	0.141	0.087	0.054	0.034	0.021	0.013	0.009	0.005	0.003	0.002	0.001

(Contd..)

Table C Contd.

	Interest Rate												
Year	***15%***	***16%***	***17%***	***18%***	***19%***	***20%***	***21%***	***22%***	***23%***	***24%***	***25%***	***30%***	***40%***
1	0.870	0.862	0.855	0.847	0.840	0.833	0.826	0.820	0.813	0.806	0.800	0.769	0.714
2	0.756	0.743	0.731	0.718	0.706	0.694	0.683	0.672	0.661	0.650	0.640	0.592	0.510
3	0.658	0.641	0.624	0.609	0.593	0.579	0.564	0.551	0.537	0.524	0.512	0.455	0.364
4	0.572	0.552	0.534	0.516	0.499	0.482	0.467	0.451	0.437	0.423	0.410	0.350	0.260
5	0.497	0.476	0.456	0.437	0.419	0.402	0.386	0.370	0.355	0.341	0.328	0.269	0.186
6	0.432	0.410	0.390	0.370	0.352	0.335	0.319	0.303	0.289	0.275	0.262	0.207	0.133
7	0.376	0.354	0.333	0.314	0.296	0.279	0.263	0.249	0.235	0.222	0.210	0.159	0.095
8	0.327	0.305	0.285	0.266	0.249	0.233	0.218	0.204	0.191	0.179	0.168	0.123	0.068
9	0.284	0.263	0.243	0.225	0.209	0.194	0.180	0.167	0.155	0.144	0.134	0.094	0.048
10	0.247	0.227	0.208	0.191	0.176	0.162	0.149	0.137	0.126	0.116	0.107	0.073	0.035
11	0.215	0.195	0.178	0.162	0.148	0.135	0.123	0.112	0.103	0.094	0.086	0.056	0.025
12	0.187	0.168	0.152	0.137	0.124	0.112	0.102	0.092	0.083	0.076	0.069	0.043	0.018
13	0.163	0.145	0.130	0.116	0.104	0.093	0.084	0.075	0.068	0.061	0.055	0.033	0.013
14	0.141	0.125	0.111	0.099	0.088	0.078	0.069	0.062	0.055	0.049	0.044	0.025	0.009
15	0.123	0.108	0.095	0.084	0.074	0.065	0.057	0.051	0.045	0.040	0.035	0.020	0.006
16	0.107	0.093	0.081	0.071	0.062	0.054	0.047	0.042	0.036	0.032	0.028	0.015	0.005
17	0.093	0.080	0.069	0.060	0.052	0.045	0.039	0.034	0.030	0.026	0.023	0.012	0.003
18	0.081	0.069	0.059	0.051	0.044	0.038	0.032	0.028	0.024	0.021	0.018	0.009	0.002
19	0.070	0.060	0.051	0.043	0.037	0.031	0.027	0.023	0.020	0.017	0.014	0.007	0.002
20	0.061	0.051	0.043	0.037	0.031	0.026	0.022	0.019	0.016	0.014	0.012	0.005	0.001
25	0.030	0.024	0.020	0.016	0.013	0.010	0.009	0.007	0.006	0.005	0.004	0.001	0.000
30	0.015	0.012	0.009	0.007	0.005	0.004	0.003	0.003	0.002	0.002	0.001	0.000	0.000
40	0.004	0.003	0.002	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table D: Present Value Factor of an Annuity (PVFA) of Re 1

	Interest Rate													
Year	***1%***	***2%***	***3%***	***4%***	***5%***	***6%***	***7%***	***8%***	***9%***	***10%***	***11%***	***12%***	***13%***	***14%***
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909	0.901	0.893	0.885	0.877
2	1.970	1.942	1.913	1.886	1.859	1.833	1.808	1.783	1.759	1.736	1.713	1.690	1.668	1.647
3	2.941	2.884	2.829	2.775	2.723	2.673	2.624	2.577	2.531	2.487	2.444	2.402	2.361	2.322
4	3.902	3.808	3.717	3.630	3.546	3.465	3.387	3.312	3.240	3.170	3.102	3.037	2.974	2.914
5	4.853	4.713	4.580	4.452	4.329	4.212	4.100	3.993	3.890	3.791	3.696	3.605	3.517	3.433
6	5.795	5.601	5.417	5.242	5.076	4.917	4.767	4.623	4.486	4.355	4.231	4.111	3.998	3.889
7	6.728	6.472	6.230	6.002	5.786	5.582	5.389	5.206	5.033	4.868	4.712	4.564	4.423	4.288
8	7.652	7.325	7.020	6.733	6.463	6.210	5.971	5.747	5.535	5.335	5.146	4.968	4.799	4.639
9	8.566	8.162	7.786	7.435	7.108	6.802	6.515	6.247	5.995	5.759	5.537	5.328	5.132	4.946
10	9.471	8.983	8.530	8.111	7.722	7.360	7.024	6.710	6.418	6.145	5.889	5.650	5.426	5.216
11	10.368	9.787	9.253	8.760	8.306	7.887	7.499	7.139	6.805	6.495	6.207	5.938	5.687	5.453
12	11.255	10.575	9.954	9.385	8.863	8.384	7.943	7.536	7.161	6.814	6.492	6.194	5.918	5.660
13	12.134	11.348	10.635	9.986	9.394	8.853	8.358	7.904	7.487	7.103	6.750	6.424	6.122	5.842
14	13.004	12.106	11.296	10.563	9.899	9.295	8.745	8.244	7.786	7.367	6.982	6.628	6.302	6.002
15	13.865	12.849	11.938	11.118	10.380	9.712	9.108	8.559	8.061	7.606	7.191	6.811	6.462	6.142
16	14.718	13.578	12.561	11.652	10.838	10.106	9.447	8.851	8.313	7.824	7.379	6.974	6.604	6.265
17	15.562	14.292	13.166	12.166	11.274	10.477	9.763	9.122	8.544	8.022	7.549	7.120	6.729	6.373
18	16.398	14.992	13.754	12.659	11.690	10.828	10.059	9.372	8.756	8.201	7.702	7.250	6.840	6.467
19	17.226	15.678	14.324	13.134	12.085	11.158	10.336	9.604	8.950	8.365	7.839	7.366	6.938	6.550
20	18.046	16.351	14.877	13.590	12.462	11.470	10.594	9.818	9.129	8.514	7.963	7.469	7.025	6.623
25	22.023	19.523	17.413	15.622	14.094	12.783	11.654	10.675	9.823	9.077	8.422	7.843	7.330	6.873
30	25.808	22.396	19.600	17.292	15.372	13.765	12.409	11.258	10.274	9.427	8.694	8.055	7.496	7.003
40	32.835	27.355	23.115	19.793	17.159	15.046	13.332	11.925	10.757	9.779	8.951	8.244	7.634	7.105
50	39.196	31.424	25.730	21.482	18.256	15.762	13.801	12.233	10.962	9.915	9.042	8.304	7.675	7.133

(Contd..)

Table D Contd.

	Interest Rate												
Year	***15%***	***16%***	***17%***	***18%***	***19%***	***20%***	***21%***	***22%***	***23%***	***24%***	***25%***	***30%***	***40%***
1	0.870	0.862	0.855	0.847	0.840	0.833	0.826	0.820	0.813	0.806	0.800	0.769	0.714
2	1.626	1.605	1.585	1.566	1.547	1.528	1.509	1.492	1.474	1.457	1.440	1.361	1.224
3	2.283	2.246	2.210	2.174	2.140	2.106	2.074	2.042	2.011	1.981	1.952	1.816	1.589
4	2.855	2.798	2.743	2.690	2.639	2.589	2.540	2.494	2.448	2.404	2.362	2.166	1.849
5	3.352	3.274	3.199	3.127	3.058	2.991	2.926	2.864	2.803	2.745	2.689	2.436	2.035
6	3.784	3.685	3.589	3.498	3.410	3.326	3.245	3.167	3.092	3.020	2.951	2.643	2.168
7	4.160	4.039	3.922	3.812	3.706	3.605	3.508	3.416	3.327	3.242	3.161	2.802	2.263
8	4.487	4.344	4.207	4.078	3.954	3.837	3.726	3.619	3.518	3.421	3.329	2.925	2.331
9	4.772	4.607	4.451	4.303	4.163	4.031	3.905	3.786	3.673	3.566	3.463	3.019	2.379
10	5.019	4.833	4.659	4.494	4.339	4.192	4.054	3.923	3.799	3.682	3.571	3.092	2.414
11	5.234	5.029	4.836	4.656	4.486	4.327	4.177	4.035	3.902	3.776	3.656	3.147	2.438
12	5.421	5.197	4.988	4.793	4.611	4.439	4.278	4.127	3.985	3.851	3.725	3.190	2.456
13	5.583	5.342	5.118	4.910	4.715	4.533	4.362	4.203	4.053	3.912	3.780	3.223	2.469
14	5.724	5.468	5.229	5.008	4.802	4.611	4.432	4.265	4.108	3.962	3.824	3.249	2.478
15	5.847	5.575	5.324	5.092	4.876	4.675	4.489	4.315	4.153	4.001	3.859	3.268	2.484
16	5.954	5.668	5.405	5.162	4.938	4.730	4.536	4.357	4.189	4.033	3.887	3.283	2.489
17	6.047	5.749	5.475	5.222	4.990	4.775	4.576	4.391	4.219	4.059	3.910	3.295	2.492
18	6.128	5.818	5.534	5.273	5.033	4.812	4.608	4.419	4.243	4.080	3.928	3.304	2.494
19	6.198	5.877	5.584	5.316	5.070	4.843	4.635	4.442	4.263	4.097	3.942	3.311	2.496
20	6.259	5.929	5.628	5.353	5.101	4.870	4.657	4.460	4.279	4.110	3.954	3.316	2.497
25	6.464	6.097	5.766	5.467	5.195	4.948	4.721	4.514	4.323	4.147	3.985	3.329	2.499
30	6.566	6.177	5.829	5.517	5.235	4.979	4.746	4.534	4.339	4.160	3.995	3.332	2.500
40	6.642	6.233	5.871	5.548	5.258	4.997	4.760	4.544	4.347	4.166	3.999	3.333	2.500
50	6.661	6.246	5.880	5.554	5.262	4.999	4.762	4.545	4.348	4.167	4.000	3.333	2.500

Table E: Continuous Compounding of Re 1 e^x and Continuous Discounting of Re 1

$$(e^x): \lim_{m \to \infty} \left(1 + \frac{i}{m}\right)^{(nm)} \quad \text{or} \quad e^{(i)(n)}$$

x	e^x Value	e^{-x} Value	x	e^x Value	e^{-x} Value	x	e^x Value	e^{-x} Value
0.00	1.0000	1.00000	0.45	1.5683	.63763	0.90	2.4596	.40657
0.01	1.0110	0.99005	0.46	1.5841	.63128	0.91	2.4843	.40252
0.02	1.0202	.98020	0.47	1.6000	.62500	0.92	2.5093	.39852
0.03	1.0305	.97045	0.48	1.6161	.61878	0.93	2.5345	.39455
0.04	1.0408	.96079	0.49	1.6323	.61263	0.94	2.5600	.39063
0.05	1.0513	.95123	0.50	1.6487	.60653	0.95	2.5857	.38674
0.06	1.0618	.94176	0.51	1.6653	.60050	0.96	2.6117	.38298
0.07	1.0725	.93239	0.52	1.6820	.59452	0.97	2.6379	.37908
0.08	1.0833	.92312	0.53	1.6989	.58860	0.98	2.6645	.37531
0.09	1.0942	.91393	0.54	1.7160	.58275	0.99	2.6912	.37158
0.10	1.1052	.90484	0.55	1.7333	.57695	1.00	2.7183	.36788
0.11	1.1163	.89583	0.56	1.7307	.57121	1.20	3.3201	.30119
0.12	1.1275	.88692	0.57	1.7683	.56553	1.30	3.6693	.27253
0.13	1.1388	.87809	0.58	1.7860	.55990	1.40	4.0552	.24660
0.14	1.1503	.86936	0.59	1.8040	.55433	1.50	4.4817	.22313
0.15	1.1618	.86071	0.60	1.8221	.54881	1.60	4.9530	.20190
0.16	1.1735	.85214	0.61	1.8404	.54335	1.70	5.4739	.18268
0.17	1.1853	.84366	0.62	1.8589	.53794	1.80	6.0496	.16530
0.18	1.1972	.83527	0.63	1.8776	.53259	1.90	6.6859	.14957
0.19	1.2092	.82696	0.64	1.9865	.52729	2.00	7.3891	.13534
0.20	1.2214	.81873	0.65	1.9155	.52205	3.00	20.086	.04979
0.21	1.2337	.81058	0.66	1.9348	.51885	4.00	54.598	.01832
0.22	1.2461	.80252	0.67	1.9542	.51171	5.00	148.41	.00674
0.23	1.2586	.79453	0.68	1.9739	.50662	6.00	403.43	.00248
0.24	1.2712	.78663	0.69	1.9937	.50158	7.00	1096.6	.00091
0.25	1.2840	.77880	0.70	2.0138	.49659	8.00	2981.0	.00034
0.26	1.2969	.77105	0.71	2.0340	.49164	9.00	8103.1	.00012
0.27	1.3100	.76338	0.72	2.0544	.48675	10.00	22026.5	.00005
0.28	1.3231	.75578	0.73	2.0751	.48191			
0.29	1.3364	.74826	0.74	2.0959	.47711			
0.30	1.3499	.74082	0.75	2.1170	.47237			
0.31	1.3634	.73345	0.76	2.1383	.46767			
0.32	1.3771	.72615	0.77	2.1598	.46301			
0.33	1.3910	.71892	0.78	2.1815	.45841			
0.34	1.4049	.71177	0.79	2.2034	.45384			
0.35	1.4191	.70569	0.80	2.2255	.44933			
0.36	1.4333	.69768	0.81	2.2479	.44486			
0.37	1.4477	.69073	0.82	2.2705	.44043			
0.38	1.4623	.68386	0.83	2.2933	.43605			
0.39	1.4770	.67707	0.84	2.3164	.43171			
0.40	1.4918	.67032	0.85	2.3396	.42741			
0.41	1.5068	.66365	0.86	2.3632	.42316			
0.42	1.5220	.65705	0.87	2.3869	.41895			
0.43	1.5373	.65051	0.88	2.4109	.41478			
0.44	1.5527	.64404	0.89	2.4351	.41066			

NOTES