

FINANCIAL MANAGEMENT



Theory and Practice



7e

Prasanna Chandra



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Preface to the Seventh Edition

Financial Management: Theory and Practice, 7/e is designed as a comprehensive reference cum textbook in financial management. This book seeks to:

- Build understanding of the central ideas and theories of modern finance.
- Develop familiarity with the analytical techniques helpful in financial decision making.
- Furnish institutional material relevant for understanding the environment in which financial decisions are taken.
- Discuss the practice of financial management.

The primary thrust of the book is to show how financial theory can be applied to solve problems in practice. An attempt has been made to relate theory to practice. Of course, the theory presented has its imperfections and inadequacies—which theory does not? Yet, it is a potent tool for analysing practical problems.

A Response to Evolving Concerns

The past two decades have witnessed a dramatic transformation of the Indian business and financial scene, thanks to deregulation, liberalisation, partial privatisation, globalisation, automation, and the ascendance of the services sector.

In the wake of these developments, investment and financing avenues have expanded considerably, competition has intensified in all sectors, institutional investors have become a major force, financial prices have become more volatile, corporates have grown in size and complexity, and intangible assets have assumed greater significance.

In response to these opportunities and challenges, shareholder value has become the central corporate agenda, mergers, acquisitions, and restructuring have gathered momentum, financial derivatives have emerged as tools for risk management, corporate governance and transparency have received a lot of emphasis, and performance management has become a major concern.

This book, in its various editions, has tried to capture the central themes and evolving concerns of corporate financial management. It can perhaps claim to be the most contemporary and comprehensive Indian book in the field. This is reflected in its growing popularity among management students and practitioners.

Changes in the Seventh Edition

Enthused by the overwhelming response to the previous edition of this book and prodded by the suggestions received from the readers, I have added new material, integrated spreadsheet analysis in the book, and provided answers to the end-of-the-chapter problems and mini cases.

New Material The following new material has been added to enrich the book.

- Two new chapters titled 'Risk and Return: Portfolio Theory and Asset Pricing' (Chapter 9) and 'The State of Our Knowledge' (Chapter 41) have been added.
- Ten new sections or appendices have been included at different places: 'Business Ethics and Corporate Social Responsibility,' 'Financial Modeling Using Spreadsheets,' 'Key Growth Rates,' 'Factors Affecting the Weighted Average Cost of Capital,' 'Misconceptions Surrounding Cost of Capital,' 'Investment Banking,' 'Leverage Analysis,' 'Working Capital Leverage,' 'Comprehensive Value Metrics Framework,' and 'Debt Restructuring.'
- 12 new mini cases have been added on the following topics: 'Valuation of Bonds and Stocks,' 'Portfolio Theory and Capital Asset Pricing,' 'Options and Their Valuation,' 'Techniques of Capital Budgeting,' 'Raising Long-term Finance,' 'Capital Structure Decision,' 'Dividend Decision,' 'Leasing, Hire Purchase, and Project Finance,' 'Cash and Liquidity Management,' 'Value Based Management,' 'International Financial Management,' and 'Corporate Risk Management.'
- A number of boxes capturing new insights and contemporary practices have been included.

Spreadsheet Models At a number of places **spreadsheet models** have been integrally woven in the book. This will help students from the practical point of view because spreadsheet models are extensively used in practice.

Answers to Problems and Mini Cases Answers to the end-of-the-chapter problems and mini cases are given at the end of the book. This will help students in verifying whether they have got the answers right.

Ancillary Materials

To enhance the utility of the book for students and instructors, the following ancillary materials are available.

- **Spreadsheet Templates** Dr. V. Nagadevara of Indian Institute of Management, Bangalore and 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://highered.mcgraw-hill.com/sites/0070656657>.
- **Additional Problems** A number of additional problems have been given for students who want to practice more. These may be downloaded from <http://highered.mcgraw-hill.com/sites/0070656657>.
- **Solutions Manual and Powerpoint Presentations** A solution manual containing solutions to the end of the chapter problems and cases and powerpoint presentations of all chapters are hosted on the web site of Tata McGraw-Hill. This can be accessed by the instructors who adopt the book. They may contact Tata McGraw-Hill for assistance in accessing the solutions manual and powerpoint presentation.

Special Features

Designed to provide a firm grounding in the principles, techniques, and practice of financial management, this book has the following special features:

- **Comprehensive Coverage** It covers a wide spectrum of topics in financial management quite comprehensively. Some of the topics like 'Value Based Management,' 'Financial Management in Sick Units,' 'Financial Management in Intangible-Intensive Companies,' and 'The State of Our Knowledge' are not found in most other books.
- **Decisional Focus and Analytical Approach** This book primarily 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, dwell on the quantitative and qualitative considerations relevant for such decisions, and explain analytical methods which are helpful in analysing these decisions.
- **Numerous Illustrations** Various concepts, tools, and techniques of financial management have been illustrated with suitable examples. Where necessary, two or three examples of gradually increasing complexity have been provided.
- **Discussion of Practice** In several important areas of financial management like capital expenditure analysis, cost of capital, risk analysis, credit management, capital structure planning, and dividend policy, the practice of business firms has been described and evaluated.
- **Procedural Orientation** Procedural aspects of term loan financing, public issue of capital, lease financing, mergers and amalgamations and so on have been discussed. This is meant to give the reader a feel for 'how to go about' in the world of finance.

Organisation and Use of the Text

There are several ways of organising the material presented in this book. So, I have made the book highly modular. This gives the instructor a great deal of flexibility in sequencing the material.

I have used the material in this book for a set of two courses—basic and advanced. For the basic course titled 'Financial Management' or 'Corporate Finance' or 'Managerial Finance', I have used Parts 1 through 5 and Parts 7 and 8 with the following exceptions: Chapter 10: Options and Their Valuation, Chapter 15: Capital Budgeting—Extensions, and Chapter 31: Working Capital Management—Extensions.

For the advanced course titled 'Strategic Financial Management' or 'Advanced Financial Management' or 'Topics in Finance' I have used the rest of the book.

While the book is primarily targeted at students of MBA, CFM, ACA, AICWA, CFA and ACS programmes and finance professionals, it will be useful for all managers interested in understanding the financial dimensions of business.

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Preface to the First Edition

This book seeks to discuss the theory of finance which provides the framework for investment and financing decisions, expound several analytical methods used to cope with varied problems in financial management, and present information about the institutions and environment relevant to corporate finance.

The principle concern of the book is to show how financial theory can be applied to solve problems in practice. An attempt has been made to relate theory to practice. Of course, the theory presented has its imperfections and inadequacies. Yet, it is a potent tool for analysing practical problems.

My students and participants of numerous executive development programmes prodded me to write this book. They pointed towards the need for a book which has an adequate treatment of analytical tools, a well rounded description of tax and regulatory framework and the financial system in India, a comprehensive coverage of various issues in financial management, and a discussion of financial management practices. I am hopeful that the book meets these requirements.

In writing this book, I have drawn on a vast amount of literature in finance. Naturally, I owe an intellectual debt to the numerous authors who have enriched the stream of literature in finance by their contributions. I have also benefited from the insights and experiences of a number of practitioners in the field, with whom I have had many discussions.

I express my thanks to Smt. B S Nagaveni and Smt. P S Shantha Bai who cheerfully typed the manuscript of the book. My greatest gratitude, of course, is to my wife, Padma, for her encouragement and sacrifice.

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- A number of academics and practitioners for generously sharing their insights and experiences with me.
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I eagerly look forward to suggestions for improvements in this book.

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INTRODUCTION

- 1 Financial Management: An Overview**
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Financial Management: An Overview

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 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 odyssey, let us get a bird's eye view of financial management, also referred to as *corporate finance* or *managerial finance*. This chapter provides such an overview. It is organised into twelve sections.

- Evolution of financial management
- Financial decisions in a firm
- Goal of financial management
- Fundamental principle of finance
- Risk-return tradeoff
- Forms of business organisation
- Agency problem
- Business ethics and social responsibility
- Organisation of the finance function
- Relationship of finance to economics and accounting
- Emerging role of the financial manager in India
- Outline of the book

I. I ■ EVOLUTION OF FINANCIAL MANAGEMENT

Financial management emerged as a distinct field of study at the turn of the 20th century. Its evolution may be divided into three broad phases (though the demarcating lines between these phases are somewhat arbitrary)—the traditional phase, the transitional phase, and the modern phase.

The *traditional phase* lasted for about four decades. The following were its important features:

- The focus of financial management was mainly on certain episodic events like formation, issuance of capital, major expansion, merger, reorganisation, and liquidation in the life cycle of the firm.
- The approach was mainly descriptive and institutional. The instruments of financing, the institutions and procedures used in capital markets, and the legal aspects of financial events formed the core of financial management.
- The outsider's point of view was dominant. Financial management was viewed mainly from the point of view of the investment bankers, lenders, and other outside interests.

A typical work of the traditional phase is *The Financial Policy of Corporations*¹ by Arthur S. Dewing. This book discusses at length the types of securities, procedures used in issuing these securities, bankruptcy, reorganisations, mergers, consolidations, and combinations. The treatment of these topics is essentially descriptive, institutional, and legalistic.

The *transitional phase* began around the early 1940s and continued through the early 1950s. Though the nature of financial management during this phase was similar to that of the traditional phase, greater emphasis was placed on the day-to-day problems faced by financial managers in the areas of funds analysis, planning, and control. The focus shifted to working capital management. A representative work of this phase is *Essays on Business Finance*² by Wilford J. Eitman *et al.*

The *modern phase* began in the mid 1950s and has witnessed an accelerated pace of development with the infusion of ideas from economic theory and application of quantitative methods of analysis. The distinctive features of the modern phase are:

- The central concern of financial management is considered to be a rational matching of funds to their uses so as to maximise the wealth of current shareholders.
- The approach of financial management has become more analytical and quantitative.

Since the beginning of the modern phase many significant and seminal developments have occurred in the fields of capital budgeting, asset pricing theory, capital structure theory, efficient market theory, option pricing theory, agency theory, valuation models, dividend policy, working capital management, financial modeling, and behavioral finance. Many more exciting developments are in the offing making finance a fascinating and challenging field.

¹ Arthur S. Dewing , *The Financial Policy of Corporations*, New York, Ronalds, 1918.

² Wilford J. Eiteman *et al.*, *Essays on Business Finance*, Ann Arbor, Michigan, Masterco Press Inc., 1953.

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. This is referred to as strategic planning and it has a significant bearing on how capital is allocated in the firm. As strategic 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 is 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 FINANCIAL MANAGEMENT

Much of the theory in corporate finance is based on the assumption that the goal of the firm should be to maximise the wealth of its current shareholders. This goal has been

eloquently defended by distinguished finance scholars, economists, and practitioners. Here is a sampling of their views:

"In a market-based economy which recognises the rights of private property, the only social responsibility of business is to create value and do so legally and with integrity. It is a profound error to view increases in a company's value as a concern just for its shareholders. Enlightened managers and public officials recognise that increases in stock prices reflect improvement in competitiveness—an issue which affects everyone who has a stake in the company or economy".³

"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".⁴

"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".⁵

"Those who regard shareholder wealth maximisation as irrelevant or immoral are forgetting that shareholders are not merely the beneficiary of a corporation's financial successes, but also the referee who determine management's financial power".⁶

Despite the forceful arguments in favour of the goal of shareholder wealth maximisation, its supremacy has been challenged, among others, by the capital market sceptics, the strategic visionaries, and the balancers. The arguments of these critics and the rebuttal by the defendants of shareholder wealth maximisation principle are summarised below.

Critique	Defence
<ul style="list-style-type: none"> ■ The <i>capital market sceptics</i> argue that the stock market displays myopic tendencies, often wrongly prices securities, and fails to reflect long-term values. Managers, on the other hand, are well-informed and make decisions based on more reliable and robust measures of value creation. ■ The <i>strategic visionaries</i> argue that the firms should pursue a product market goal like maximising the market share, or enhancing customer satisfaction, or minimising costs 	<ul style="list-style-type: none"> ■ Based on extensive empirical evidence, financial economists argue that in developed capital markets, share prices are the least biased estimates of intrinsic values and managers are not generally better than investors in assessing values. ■ It is true that shareholder wealth is created only through successful product market strategies. For example, satisfied and loyal customers are essential for value creation. However, beyond a certain point customer satisfaction comes at the cost of shareholder

(Contd.)

³ Alfred Rappaport, "Let's Let Business Be Business", *New York Times*, February 4, 1990.

⁴ Michael Jenson *Economist* 1997.

⁵ Bennett Stewart, *The Quest for Value: A Guide to Senior Management*, New York: Harper & Row, 1991.

⁶ Jack L. Treynor, "The Financial Objective in the Widely Held Corporation", *Financial Analysts Journal* March–April, 1981.

Critique	Defence
<p>in relation to competitors, or achieving a zero defect level. If the firm succeeds in implementing its product market strategy, investors would be amply rewarded</p> <ul style="list-style-type: none"> The <i>balancers</i> argue that a firm should seek to 'balance' the interest of various stakeholders, viz. customers, employees, shareholders, creditors, suppliers, community, and others. 	<p>value. When that happens, the conflict should be resolved in favour of shareholders to enhance the long-term viability and competitiveness of the firm.</p> <ul style="list-style-type: none"> Balancing the interest of various stakeholders is not a practical governing objective. There is no way to figure out what the right 'balance' is. When managers confront complex problems involving numerous tradeoffs, they will have no clear guidelines on how to resolve the differences. Each manager would be left to his own judgment. In a large organisation this can lead to confusion and even chaos.

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 shareholders' wealth. It suffers from several limitations:

- 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.
- If profits are uncertain and described by a probability distribution, the meaning of profit maximisation is not clear.

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 also 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. Though the strict validity of this goal rests on certain rigid assumptions, it can be reasonably defended as a guide for financial decision-making under fairly plausible assumptions about capital markets.

A Modification Given a certain number of outstanding shares, managers should act to maximise the current share price of their firm. However, if managers believe that the intrinsic value of their firm's share differs from the current market price of the share, then an important issue arises: Should managers seek to maximise the current market price of the share, which embeds only public information, or should they seek to maximise the intrinsic value of the share, based on their private information? If they seek to maximise

the current market price they serve the interest of short-term shareholders; if they seek to maximise the intrinsic value of the share they serve the interest of long-term shareholders.

Given this inherent conflict, managers may strive to maximise a **weighted average** of the firm's **current share price (S_c)** and its **intrinsic value (S_I)** as shown below:

$$W_c S_c + W_I S_I$$

What Do Firms Do? Business firms often pursue several goals. They seek to achieve a high rate of growth, enjoy a substantial market share, attain product and technological leadership, promote employee welfare, further customer satisfaction, support education and research, improve community life, and solve other societal problems. Some of these goals may, of course, be in consonance with the goal of shareholder wealth maximisation. For, a rapid growth rate, a dominant market position, and a higher customer satisfaction may lead to increasing returns for equity shareholders. Even efforts towards solving societal problems may further the interest of shareholders in the long run by improving the image of the firm and strengthening its relationship with the environment. When these other goals seem to conflict with the goal of maximising shareholder wealth, it is helpful to know the cost of pursuing these goals. The tradeoff has to be understood. It should be appreciated that maximisation of the wealth of shareholders constitutes the principal guarantee for efficient allocation of resources in the economy and hence is to be regarded as the normative goal from the financial point of view.

Shareholder Orientation in India Most companies in India till recently paid lip service to the goal of shareholder wealth maximisation. They showed sporadic concern for the shareholders, mainly when they approached the capital market for raising capital. Things, however, are changing. A confluence of forces appears now to be prodding companies to accord greater importance to the goal of shareholder wealth maximisation. The important ones are as follows:

Foreign Exposure The scions of most business families have gone abroad for higher education, particularly to the US. Hence they seem to appreciate the importance of shareholder value more.

Greater Dependence on Capital Market In the wake of liberalisation, the investment opportunities for the private sector have expanded considerably and consequently its appetite for funds has increased substantially. Thanks to significant freedom that companies now enjoy in pricing equity issues, there is a stronger incentive to access the capital market. The higher corporate needs for funds and the greater dependence on the capital market have induced firms to become more shareholder friendly.

Growing Importance of Institutional Investors Companies are relying more on mutual funds, financial institutions, and foreign institutional investors for raising equity capital. Institutional investors tend to be more discerning and have the muscle and motivation to nudge companies to pursue shareholder friendly policies.

Abolition of Wealth Tax on Financial Assets Previously wealth tax, subject to some exemptions, was payable on equity shares. This induced many controlling groups to ignore and even depress share prices. With the abolition of wealth tax on equity shares and other financial

assets, there is now an incentive to enhance share prices. This gets heightened when business magnates nurture a desire to join the exclusive billionaire's club.

To sum up, in the new environment there is a greater incentive and compulsion to focus on creating value for shareholders. This new corporate thinking has been articulated very clearly in the chairman's statement to the shareholders in the 1993 Annual Report of Reliance Industries Limited, the company with the largest investor base, as follows: "In everything that we do, we have only one supreme goal, that is to maximise your wealth as members of India's largest investor family". A similar view has been echoed by Anand Mahindra: "All of us are beginning to look at companies as owned by shareholders. The key is to raise shareholder returns. Those companies where the promoters continue to believe that they own the company and everything they do is in their own interest, are in trouble."

Interestingly, the Kumar Mangalam Committee on Corporate Governance, set up by the Securities Exchange Board of India, in its draft report mentioned that "The fundamental objective of corporate governance is the enhancement of the long-term shareholder value while at the same time protecting the interest of other stakeholders."

1.4 ■ THE 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:

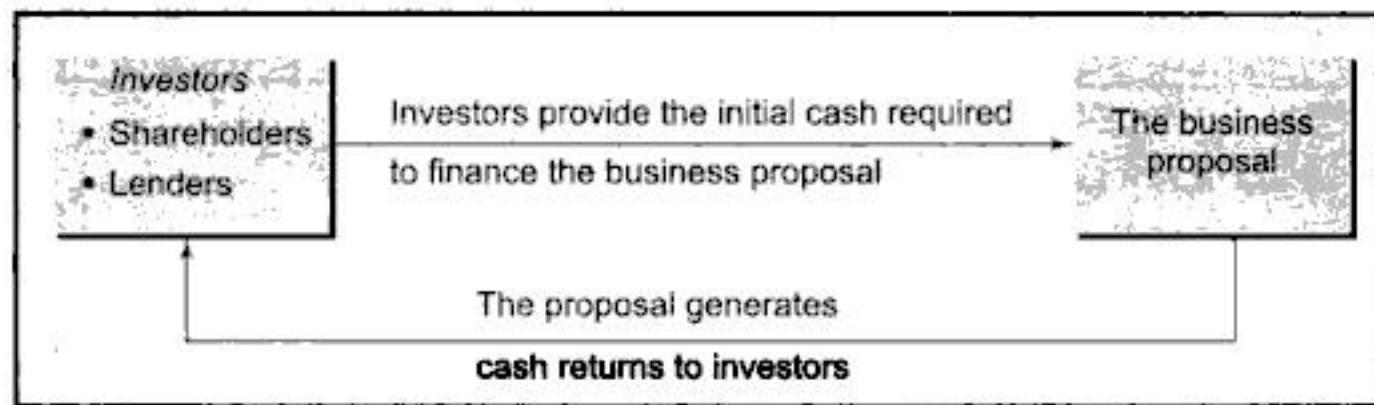
A business proposal—regardless of whether it is a new investment or acquisition of another company or a restructuring initiative—raises the value of the firm only if the present value of the future stream of net cash benefits expected from the proposal is greater than the initial cash outlay required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

$$\text{Net present value} = \text{Present value of future cash benefits} - \text{Initial cash outlay}$$

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 are hence 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.

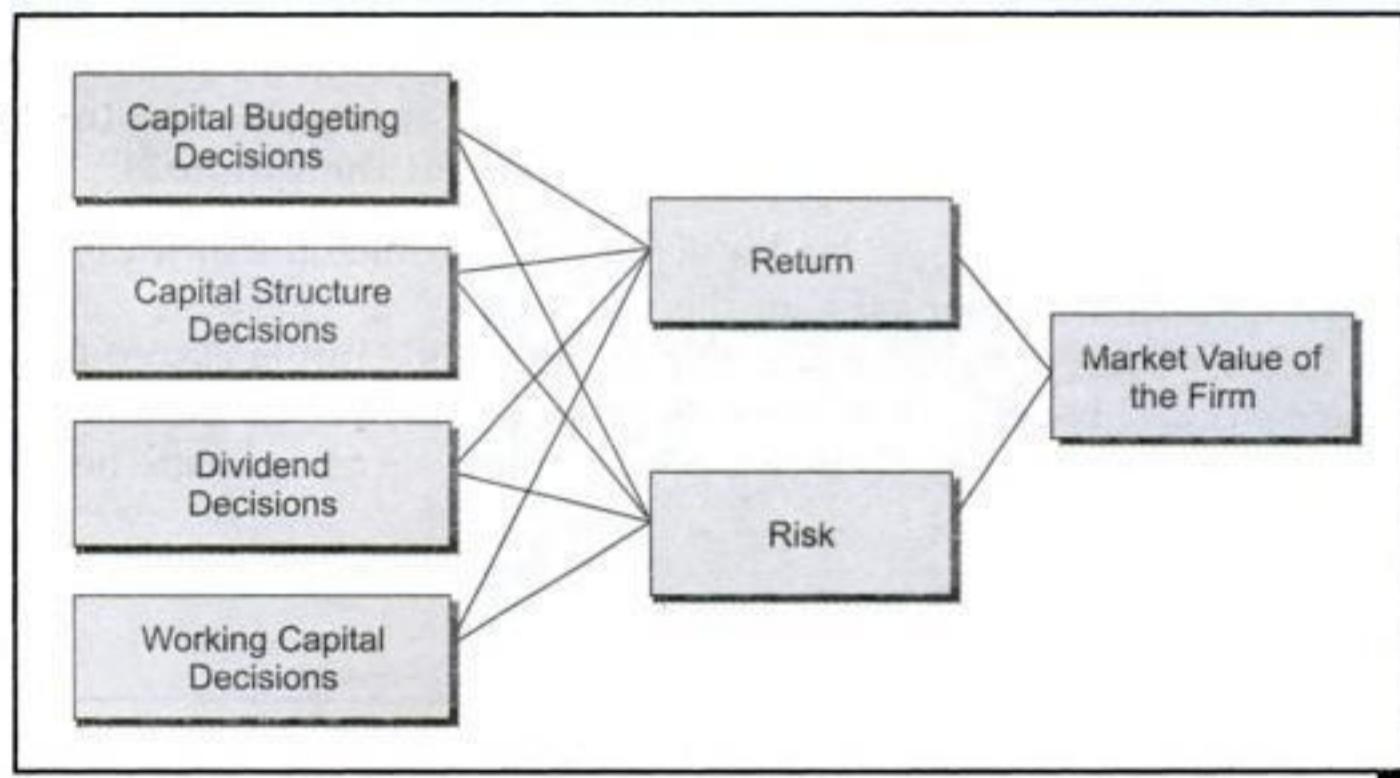
1.5 ≡ RISK-RETURN TRADEOFF

Financial decisions often involve alternative courses of action. Should the firm set up a plant which has a capacity of one million tons or two million tons? Should the debt-equity ratio of the firm be 2:1 or 1:1? Should the firm pursue a generous credit policy or niggardly credit policy? Should the firm carry a large inventory or a small inventory?

The alternative courses of action typically have different risk-return implications. A large plant may have a higher expected return and a higher risk exposure, whereas a small plant may have a lower expected return and a lower risk exposure. A higher debt-equity ratio, compared to a lower debt-equity ratio, may reduce the cost of capital but expose the firm to greater risk. A 'hot' stock, compared to a defensive stock, may offer a higher expected return but also a greater possibility of loss.

In general, when you make a financial decision, you have to answer the following questions: What is the expected return? What is the risk exposure? Given the risk-return characteristics of the decision, how would it influence value? Exhibit 1.2 shows schematically the relationship between the key financial decisions, return, risk, and market value.

Exhibit 1.2 Decisions, Return, Risk, and Market Value



1.6 ≡ 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 A new form of business organisation called Limited Liability Partnership (LLP) is proposed to be 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 10 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.

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.⁷ 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.

⁷ 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.

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 fifty.
- 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.

1.7 ■ AGENCY PROBLEM

In proprietorships, partnerships, and cooperative societies, owners are actively involved in management. But in companies, particularly large public limited companies, owners typically are not active managers. Instead, they entrust this responsibility to professional managers who may have little or no equity stake in the firm. There are several reasons for the separation of ownership and management in such companies:

- Most enterprises require large sums of capital to achieve economies of scale. Hence it becomes necessary to pool capital from thousands or even hundreds of thousands of owners. It is impractical for many owners to participate actively in management.
- Professional managers may be more qualified to run the business because of their technical expertise, experience, and personality traits.
- Separation of ownership and management permits unrestricted change in owners through share transfers without affecting the operations of the firm. It ensures that the 'knowhow' of the firm is not impaired, despite changes in ownership.
- Given economic uncertainties, investors would like to hold a diversified portfolio of securities. Such diversification is achievable only when ownership and management are separated.

While there are compelling reasons for separation of ownership and management, a separated structure leads to a possible conflict of interest between managers (agents) and shareholders (principals). Though managers are the agents of shareholders they are likely to act in ways that may not maximise the welfare of shareholders.

In practice, managers enjoy substantial autonomy and hence have a natural inclination to pursue their own goals. To prevent from being dislodged from their position, managers may try to achieve a certain acceptable level of performance as far as shareholder welfare is concerned. However, beyond that their personal goals like presiding over a big empire, pursuing their pet projects, diminishing their personal risks, and enjoying generous compensation and lavish perquisites tend to acquire priority over shareholder welfare.

The lack of perfect alignment between the interests of managers and shareholders results in agency costs which may be defined as the difference between the value of an actual firm and value of a hypothetical firm in which management and shareholder interests are perfectly aligned.

To mitigate the agency problem, effective monitoring has to be done and appropriate incentives have to be offered. Monitoring may be done by bonding managers, by auditing financial statements, by limiting managerial discretion in certain areas, by reviewing the actions and performance of managers periodically, and so on.

Incentives may be offered in the form of cash bonuses and perquisites that are linked to certain performance targets, stock options that grant managers the right to purchase equity shares at a certain price thereby giving them a stake in ownership, performance shares given when certain goals are achieved, and so on.

I.8 BUSINESS ETHICS AND SOCIAL RESPONSIBILITY

Is the goal of shareholder wealth maximisation compatible with high standards of ethical behaviour? Yes, it is. Many companies which are highly admired for their ethical behaviour and concern for society have created enormous value for their shareholders.

Business Ethics Business ethics refers to the standards of conduct or moral behaviour as applied to business practices. Ethics and fraud are used commonly in business reporting, but they have different meanings. *Fraud* involves violating the law, whereas *unethical behaviour* involves breaching the code of ethics or moral behaviour. While fraud can be defined objectively, unethical behaviour is defined rather subjectively.

A business firm is deemed to practice high standards of ethics if it deals with its employees, suppliers, customers, creditors, shareholders, and community in a fair and honest manner.

In general, ethical behaviour and long-run profitability are positively correlated. Ethical behaviour helps a firm to avoid fines and legal expenses, build public trust, attract and retain talented people, and gain the loyalty of customers who appreciate its policies.

Conscious of the virtues of ethical behaviour, many firms have put in place codes of ethical behaviour. However, the most important thing is the example set by top management through its actions and behaviour and the effectiveness of the system of reward and punishment.

Of course, given the subjective nature of ethics, in many cases the choice between ethics and profits is not unambiguous. Consider the case of a pharmaceutical company that has developed a new product which is quite effective in treating a certain medical condition. While independent government tests show that the product has no adverse side effects, the research done by the company suggests, though not convincingly, that the product

may have some harmful side effects. If the company abandons the product, it denies the benefit of the product to patients and sacrifices potential profit for itself. If the company makes the product, it has to live with the discomfort of knowing that the product may cause problems to some patients. What should it do? The choice may not be easy.

Corporate Social Responsibility Corporate social responsibility, an allied issue, has received a great deal of attention particularly in recent years. There are various definitions of corporate social responsibility. The World Business Council, for example, has used the following definition:

"Corporate social responsibility is the continuing commitment by business to behave ethically and contribute to economic development while improving the quality of life of the workforce and their families as well as of the local community and society at large."

The advocates of corporate social responsibility argue that a business firm must contribute to solve societal problems. Their argument rests on the following premises:

- (a) A business operates with the franchise given to it by the society and hence it has a reciprocal obligation to the society.
- (b) Government, NGOs, and other non-business institutions may not have enough resources and capabilities to address all the societal problems. So, business firms with their massive resources and managerial capabilities must pitch in.

Economists like Frederick Hayek and Milton Friedman, however, have argued that a business firm should not swerve from its economic goal. If a business firm engages itself in social programmes it may become vulnerable to competitive encroachment. Let shareholders decide in their personal capacity what they want to contribute in various social programmes. This role should not be arrogated by corporate managements whose primary mandate is economic. Milton Friedman put it as follows: "Few trends could so thoroughly undermine the very foundation of our society as the acceptance by corporate officials as a social responsibility other than to make as much money for their stockholders as possible. This is a fundamentally subversive doctrine."

Notwithstanding the forceful argument of Milton Friedman, many business firms in practice do contribute to various social causes. They give donations to hospitals and educational institutions, contribute to relief programmes, sponsor sport events, encourage and motivate their employees to participate in community development projects, so on and so forth.

While these initiatives may appear very laudable, they entail costs and not all firms voluntarily incur such costs. Hence, compared to a firm which does not contribute to such causes, a firm which supports such causes may be at a competitive disadvantage. As long as a firm enjoys super-normal profits it can afford to bear such costs. But if a firm operates in a very competitive market and earns just normal profits, it can ill-afford to incur such costs if its competitors refrain from doing so. Thus, if the society expects business firms to solve social problems, it must impose a mandatory obligation on all firms so that the costs are evenly borne by all the firms.

Although a company that engages in socially responsible projects may *prima facie* suffer from competitive disadvantage, it may have an edge in attracting, retaining, and motivating talented employees who find meaning in participating in Corporate Social responsibility (CSR) projects. That may be an important reason why companies are embracing CSR projects. For example, Mahindra & Mahindra launched what it calls the Employee Social Options Plan (ESOP), which offers employees a wide range of CSR projects that they can participate in. As Rajeev Dubey, president (HR and corporate services) of Mahindra & Mahindra put it: "In addition to doing their job well, people seek a connection with a larger cause. Through ESOP, we are offering them a structured platform."

I.9 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.

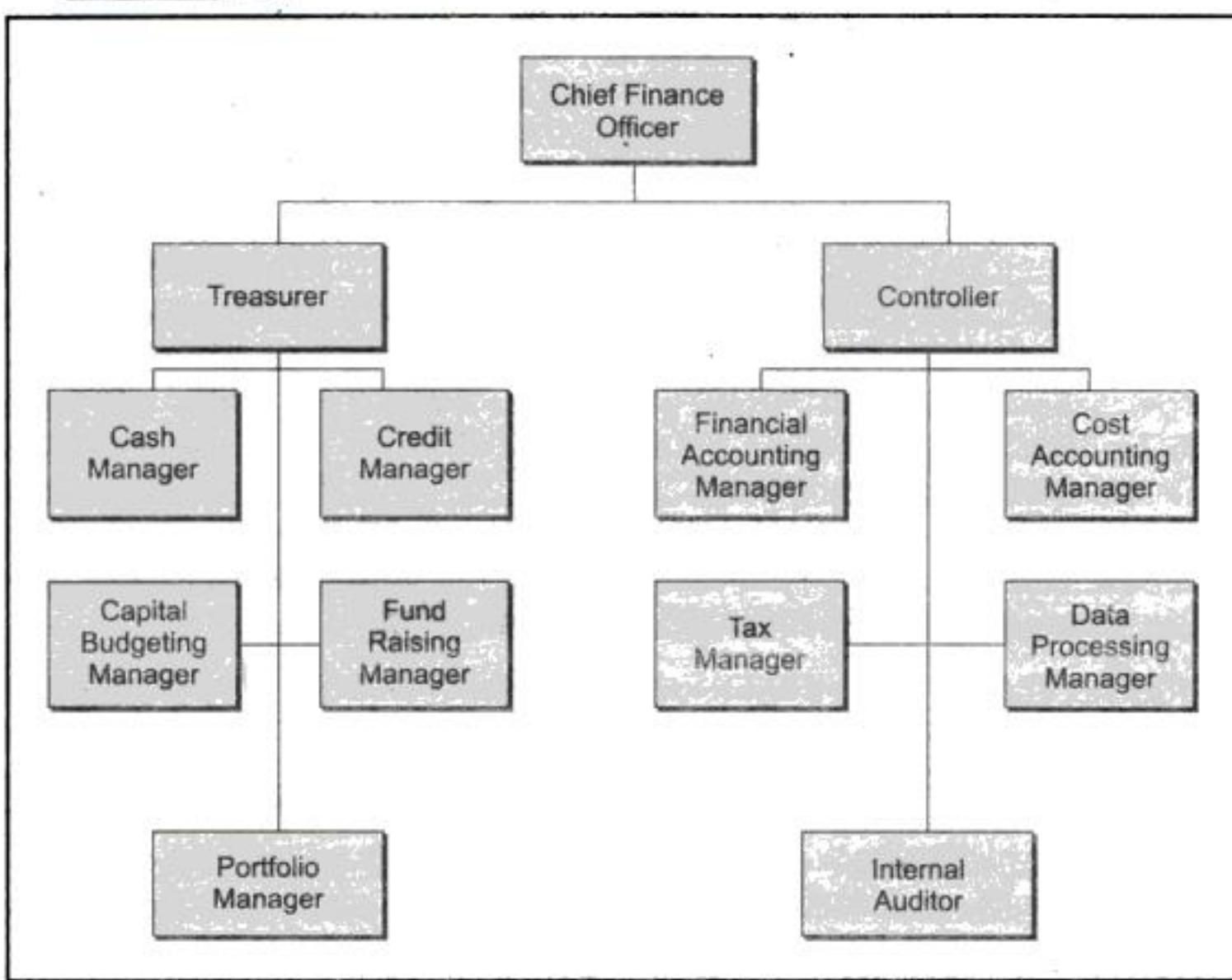
There are, however, many tasks of financial management and allied areas (like accounting) which are specialised in nature and which are attended to by specialists. These tasks and their typical distribution between the two key financial officers of the firm, the treasurer and the controller,⁸ are shown in Exhibit 1.3. Note that the treasurer is responsible mainly for financing and investment activities and the controller is concerned primarily with accounting and control.

Exhibit 1.3 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	and control

Typically, the chief finance officer, who may be designated as director (finance) or vice president (finance), 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 organised as shown in Exhibit 1.4.

⁸ Even though a firm may not have two separate financial officers designated as treasurer and controller, it is helpful to distinguish the functions of treasurership and controllership.

Exhibit 1.4 Organisation of Finance Function

The financial officers, in addition to their specialised responsibility, have significant involvement in injecting financial discipline in corporate management processes. They are responsible for emphasising 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 in the process of corporate management.

1.10 ■ 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 financial 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 financial manager to the opportunities and threats in the environment, a firm grounding in micro-economic principles sharpens his analysis of decision alternatives. 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 financial officer as shown in Exhibit 1.4. 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."⁹

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 sales¹⁰ (irrespective of whether cash is paid or not). The focus of the financial manager, however,

⁹ Lawrence J. Gitman, *Principles of Managerial Finance*, Fifth Ed., New York: Harper & Row, 1988.

¹⁰ Of course, fixed overhead expenses are typically treated as period costs and written off in the period in which they are incurred.

is on cash flows. He is concerned about the magnitude, timing, and risk of cash flows as these are the fundamental determinants of values.

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 high degree of subjectivity.

I.II ≡ EMERGING ROLE OF THE FINANCIAL MANAGER IN INDIA

Until the early 1990s, the financial manager in India functioned in a highly regulated environment and enjoyed limited freedom in designing key financial policies. From early 1990s, however, the complexion of the economic and financial environment has changed in many ways. The important changes have been as follows.

- The industrial licensing framework has been substantially relaxed, leading to considerable expansion in the scope of private sector investment.
- The Monopolies and Restrictive Trade Practices Act has been virtually abolished and the Foreign Exchange Management Act has been substantially liberalised.
- Freedom has been given to companies in designing and pricing the securities issued by them.
- The system of cash credit has been replaced by a system of working capital loans.
- Stable and administered interest rates have given way to volatile and market-determined interest rates. Exchange rates, too, have become more volatile and market-determined.
- The scope for foreign direct investment has expanded considerably and foreign portfolio investment has assumed great significance.
- Investors have become more discerning, demanding, and assertive.
- The pace of mergers, acquisitions, and restructuring has intensified.
- Derivative instruments such as options and futures have been introduced.

Thanks to these changes, the job of the financial manager in India has become more important, complex, and demanding. More so in the wake of global competition, technological developments, volatile financial prices, economic uncertainty, tax law changes, ethical concerns over financial dealings, and shareholder activism.

The key challenges for the financial manager appear to be in the following areas.

- Investment planning
- Financial structure
- Mergers, acquisitions, and restructuring
- Working capital management
- Performance management
- Risk management
- Investor relations

I.12 ■ OUTLINE OF THE BOOK

A manager should strive to maximise the value of his firm. To achieve this goal, he must understand how businesses are organised, how the financial system functions, what the tax code is, and how accounting information is used to assess business performance. In addition, he must be familiar with the fundamentals of the time value of money, risk and return relationship, and valuation of securities and derivative instruments. This background helps in making decisions that have a bearing on the value of the firm's securities. Organised to reflect these considerations, the book is divided into ten parts.

- Part I** *Introduction* Chapter 1 provides an overview of the discipline of financial management. Chapter 2 discusses the principal components of the Indian financial system. Chapter 3 examines the contents of financial statements and discusses the basics of taxation and free cash flow.
- Part II** *Financial Analysis and Planning* Chapter 4 discusses the techniques for analysing financial statements and applications of financial statement analysis. Chapter 5 presents various tools of financial planning.
- Part III** *Fundamental Valuation Concepts* Chapter 6 dwells on the ideas of compounding and discounting and their use in establishing financial equivalences. Chapter 7 explains how financial securities, bonds and equity stocks, may be valued. Chapter 8 discusses the concepts of risk and return and shows how they are related. Chapter 10 presents the option pricing model and explores its applications to corporate finance.
- Part IV** *Capital Budgeting* Chapter 11 discusses the techniques of capital budgeting. Chapter 12 shows how the project cash flows are developed. Chapter 13 presents the techniques of risk analysis. Chapter 14 explains the concept and measurement of cost of capital. Chapter 15 explores some advanced issues in capital budgeting.
- Part V** *Long-Term Financing* Chapter 16 discusses the efficient market hypothesis and examines its implications for corporate finance. Chapter 17 describes the characteristics of various sources of long-term financing. Chapter 18 explains how securities are issued in the primary market for raising long-term finance.
- Part VI** *Capital Structure and Dividend Decisions* Chapter 19 expounds various views on the relationship between capital structure and cost of capital. Chapter 20 dwells on the considerations and tools helpful in planning the capital structure. Chapter 21 examines various positions on the relationship between dividend policy and share valuation. Chapter 22 discusses practical aspects of the dividend decision.
- Part VII** *Debt and Hybrid Financing* Chapter 23 throws light on the nature of debt financing and explains analytical issues relating to debt. Chapter 24 analyses the features of leasing, hire purchase, and project finance. Chapter 25 discusses convertible debentures, warrants, and hybrid securities.
- Part VIII** *Working Capital Management* Chapters 26 through 31 focus on working capital management, which is concerned with the management of current assets and liabilities. Chapter 26 clarifies the key issues relating to working capital policy.

Chapter 27 presents the tools of cash management. Chapter 28 discusses important aspects of credit management. Chapter 29 dwells on various facets of inventory management. Chapter 30 describes various sources of financing current assets. Chapter 31 explains some advanced techniques for managing working capital.

Part IX *Corporate Valuation and Shareholder Value* Chapter 32 explains the discounted cash flow and non-discounted cash flow methods of corporate valuation. Chapter 33 expounds various approaches to value-based management. Chapter 34 explains the mechanics of mergers, acquisitions, and restructuring and discusses the financial and managerial facets of these transactions. Chapter 35 looks at various aspects of corporate governance and executive compensation. Chapter 36 discusses various issues in performance measurement and balanced scorecard.

Part X *Special Topics* Comprising Chapters 37 through 40, Part X discusses several special topics in financial management. Chapter 37 explains the distinctive features of international financial management. Chapter 38 examines the causes, symptoms, prediction, and revival of sick units. Chapter 39 explores special features of financial management in intangible-intensive companies. Chapter 40 describes a variety of hedging devices, mostly derivative instruments, and their use in corporate risk management. Chapter 41 summarises the state of our knowledge in finance.

SUMMARY

- The three broad areas of financial management are **capital budgeting**, **capital structure**, and **working capital management**.
- The primary goal of financial management is to **maximise the value of the firm**.
- A business proposal augments the value of the firm if its **net present value** is positive.
- The important forms of business organisation are the **sole proprietorship**, the **partnership firm**, the **private limited company**, and the **public limited company**. From the point of view of shareholder wealth maximisation, the public limited company form appears to be the most appropriate.
- The lack of perfect alignment between the interests of managers and shareholders results in the **agency problem**. To mitigate this problem, effective monitoring has to be done and appropriate incentives have to be offered.
- Financial management is an integral part of the job of managers. There are, however, many tasks of financial management and allied areas (like accounting), which are specialised in nature and attended by key financial officers, like the **treasurer** and the **controller**.
- A basic knowledge of **macroeconomics** is necessary for understanding the environment in which the firm operates and a good grasp of **microeconomics** is helpful in sharpening the tools of financial decision making.
- Financial decision making requires considerable inputs from **accounting**.

- Since the early 1990s the complexion of the economic and financial environment has altered in many ways, making the job of the financial manager more important, complex, and demanding.

QUESTIONS

1. Contrast the salient features of the traditional and modern approaches to financial management.
2. Discuss the three broad areas of financial decision making.
3. What is the justification for the goal of maximising the wealth of shareholders?
4. What do the critics of the goal of maximising shareholder wealth say? What is the rebuttal provided by the advocates of maximising shareholder wealth?
5. Critically evaluate the goals of maximisation of profit and maximisation of return on equity.
6. What forces are prodding companies in India to accord greater importance to the goal of shareholder wealth maximisation?
7. Discuss the risk-return tradeoff in financial decisions.
8. What are the advantages and disadvantages of the following forms of business organisation: sole proprietorship, partnership, cooperative society, private limited company, and public limited company?
9. Why is there a separation of ownership and management in large companies?
10. What are agency costs and how can they be mitigated?
11. "Financial management is in many ways an integral part of the jobs of managers." Comment.
12. How is the finance function typically organised in a large company?
13. Discuss the relationship of financial management to economics and accounting.
14. Comment on the emerging role of the financial manager in India.



The Financial System

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 of 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.

This chapter provides a conceptual framework for understanding how the financial system works, so that you can make better financial decisions. It is divided into six sections as follows:

- Functions of the financial system
- Financial assets
- Financial markets
- Financial market returns
- Financial intermediaries
- Regulatory infrastructure

2.1 ■ FUNCTIONS OF THE FINANCIAL SYSTEM¹

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

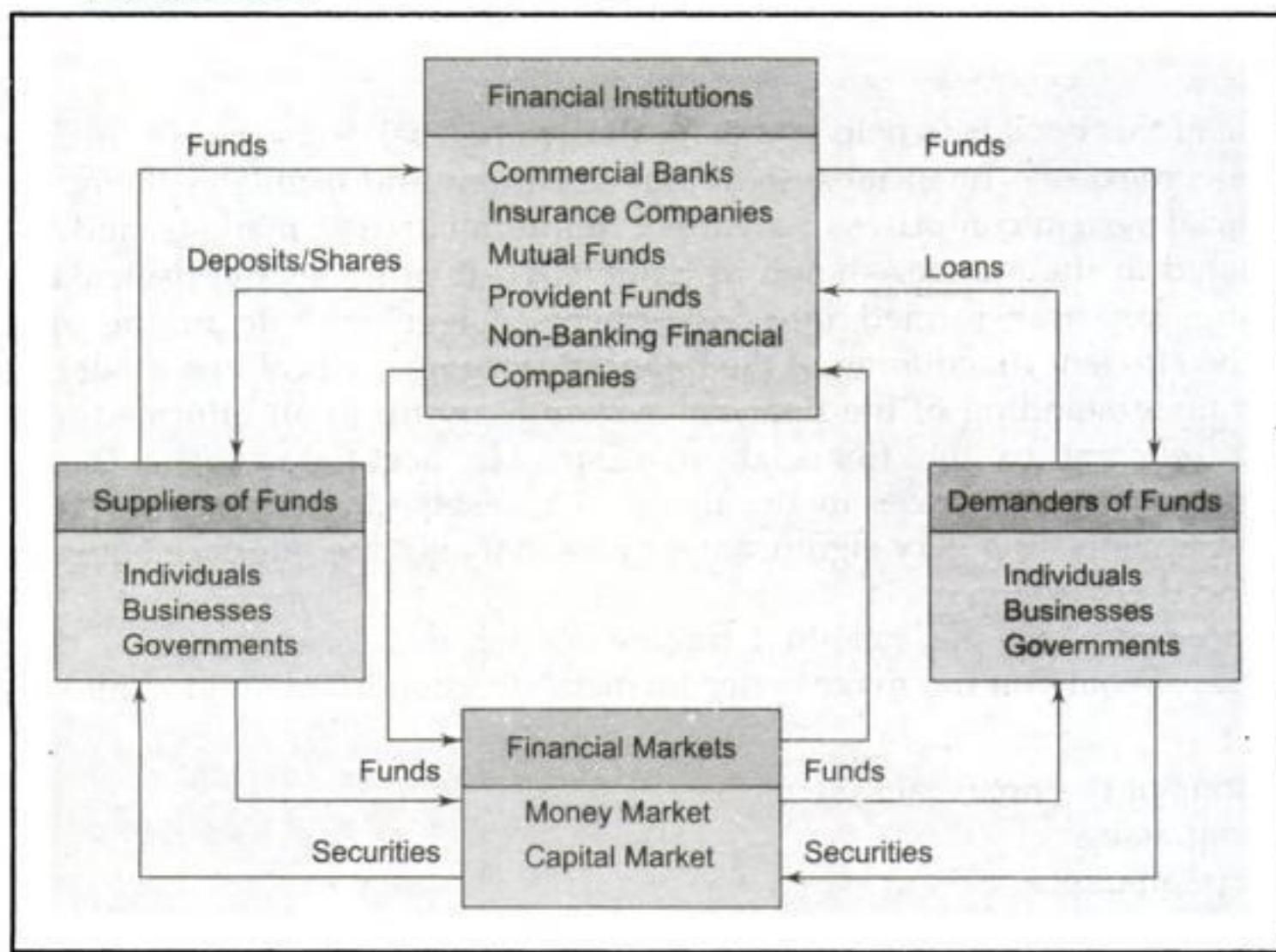
- It provides a payment system for the exchange of goods and services.
- It enables the pooling of funds for undertaking large scale enterprises.

¹ This section is based on Chapter 1 of the book *Cases in Financial Engineering* by Robert Merton *et al.*, published by the Harvard Business School Press in 1994.

- 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.

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.

Exhibit 2.1 The Financial System



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 allocations 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 solve 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:

Financial Sector Reforms in India

Until the beginning of the 1990s, the Indian financial sector was characterised by administered interest rates, large pre-emption of resources, and extensive micro regulations. It was a classic example of "financial repression," a la Mackinnon and Shaw. The financial sector reforms initiated from the early 1990s have focused on the following objectives:

- Removal of financial repression.
- Creation of an efficient, productive, and profitable financial sector.
- Evolution of market-determined interest rates.
- Granting of operational and functional autonomy to institutions.
- Opening up of the external sector in a calibrated fashion.
- Maintenance of financial stability in face of domestic and external disturbances.

Thanks to the reform measures, the Indian financial sector has become fairly sophisticated, diverse, vibrant, responsive, and resilient. It must be emphasised that this transformation has been achieved through well sequenced and coordinated policy measures.

- A 10-year bond issued by the Government of India carrying an interest rate of 7 percent.
- A 7-year non-convertible debenture issued by Reliance Industries Limited carrying an interest rate of 8 percent.
- A 3-year car loan provided by Citibank to an individual at an interest rate of 12 percent.
- 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 Rs. 1500.

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.

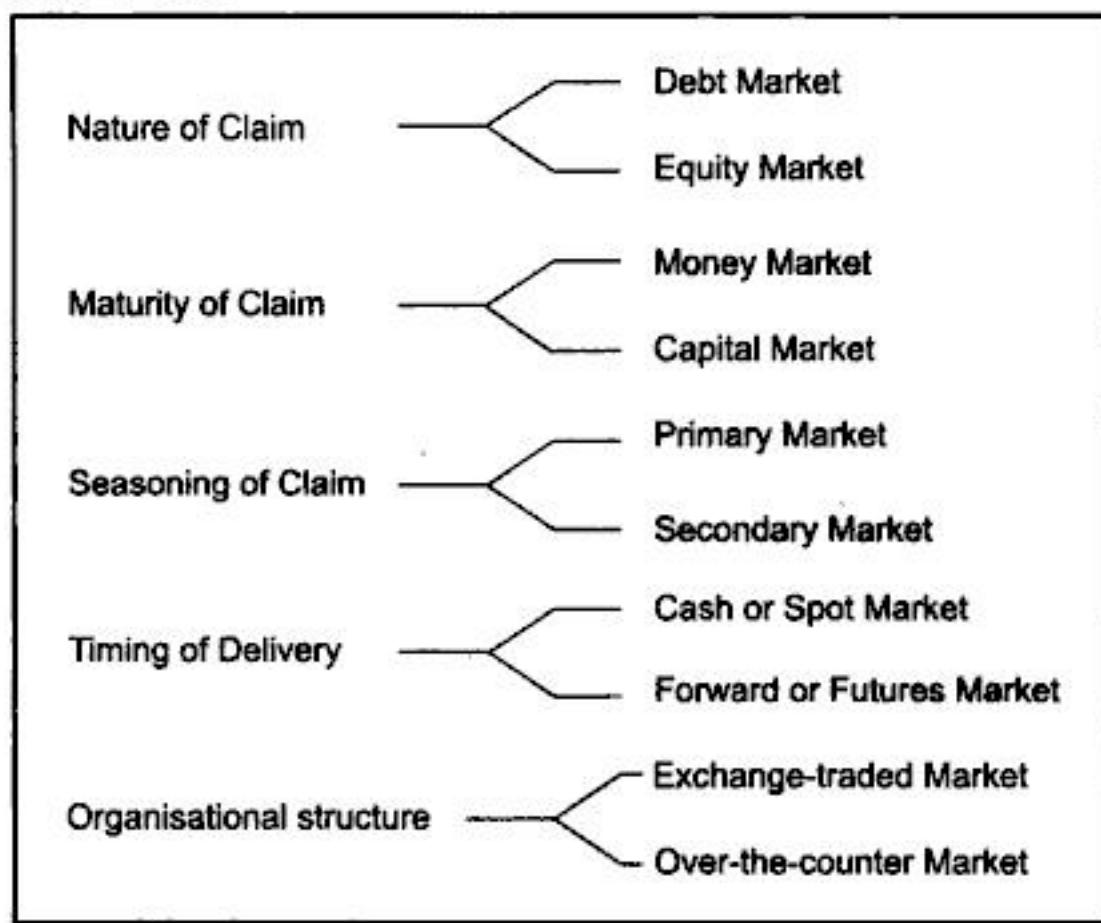
Functions of Financial Markets Financial markets play a very pivotal role in allocating resources in an economy by performing three important functions:

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 is the value of a financial asset 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* consist of 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* refers 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

Everyday 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 Rs. 100. After one year you get a dividend of Rs. 5 and the share price rises to Rs. 115. Your one-year return, r , is:

$$\begin{aligned} r &= \frac{\text{Cash dividend}}{\text{Beginning price}} + \frac{\text{Ending price} - \text{Beginning price}}{\text{Beginning price}} \\ &= \frac{5}{100} + \frac{115 - 100}{100} \\ &= 5\% + 15\% \end{aligned}$$

The first component is called the dividend income component (or dividend yield) and the second component is called the capital change 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 Rs. 100 per kg in year 0 to Rs. 110 per kg in year 1. During this period the Consumer Price Index increases from 500 to 540, that is by 8 percent. So we say that even though the nominal price of butter increased by 10 percent, its real price rose by only 1.85 percent ($1.10/1.08$).

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 percent in a year when the inflation rate is 10 percent, your real rate works out to $((1.15/1.10) - 1)$.

The general relationship between these rates is as follows:

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

Put differently,

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

Principal Determinants of Rates of Return What factors determine the rates of return in a market economy? The principal factors are:

- Expected productivity of capital
- Degree of uncertainty characterising the productivity of capital
- Time preferences of people
- Degree of risk aversion

Expected Productivity of Capital Capital resources, comprising of tangible capital and intangible capital, help in producing goods and services. Tangible capital consists of physical assets like factories, mines, dams, railway networks, power stations, roads, and inventories. Intangible capital consists of non-physical assets like patents, copyrights, technical knowhow, and brand image.

The productivity of capital is expressed as a percentage per year, referred to as the return on capital. The expected return on capital varies across time and place. *Inter alia*, it depends on the state of technology, availability of other factors of production, and the strength of demand for goods and services produced by capital.

The returns earned by investors ultimately depend on how productive the capital is. Hence, the higher the expected productivity of capital, the higher the level of interest rates in the economy, and vice versa.

Degree of Uncertainty about Productivity of Capital The return on capital is subject to uncertainty stemming from a host of factors like technological changes, shifts in consumer preferences, erratic weather, policy changes, social unrest, and so on.

Equity securities have a claim to the profits earned on capital. Other things being equal, the higher the degree of uncertainty about the productivity of capital, the higher the risk premium required by equity investors, and vice versa.

Time Preferences of People People prefer current consumption to future consumption. Why? A principal reason is that they know that they are alive now and can enjoy current consumption whereas they are not sure whether they will be alive in future to enjoy deferred consumption. Other things being equal, the greater the preference of the society for current consumption, the higher the interest rate in the economy and vice versa.

Degree of Risk Aversion The return on capital in any economy, as we have learnt, is uncertain. The financial system provides a mechanism for partitioning the uncertain return on capital into different streams subject to different risks. Very broadly, it splits the uncertain return on capital into two components: a risk-free return earned on debt securities and a risky return earned on equity securities. The following relationship holds:

$$\text{Risk-free return on debt securities} < \text{Expected return on capital} < \text{Expected return on equity securities}$$

Put differently, risk-averse people who want a risk-free return have to compensate risk-tolerant people for bearing risk in the form of risk premium. Other things being equal, the higher the degree of risk-aversion of the population, the higher will be the risk premium, and correspondingly the lower will be the risk-free rate.

Other Factors that Influence Interest Rate Levels The following are the other factors that influence interest rates: monetary policy, fiscal deficit or surplus, international flows, and the level of business activity.

Money Supply The Reserve Bank of India (RBI) regulates the money supply in the economy. An expansionary monetary policy of RBI lowers the interest rates. A contractionary monetary policy, on the other hand, pushes the interest rates up.

Fiscal Deficit (or Surplus) If the government spends more than its revenues, it runs a fiscal deficit which is met by borrowing or printing money. If the government borrows, it pushes the interest rate up. If it prints money, the increased money supply raises inflationary expectations, which eventually pushes interest rates up. Thus, other things being equal, the larger the fiscal deficit, the higher the interest rate. A fiscal surplus has the opposite effects.

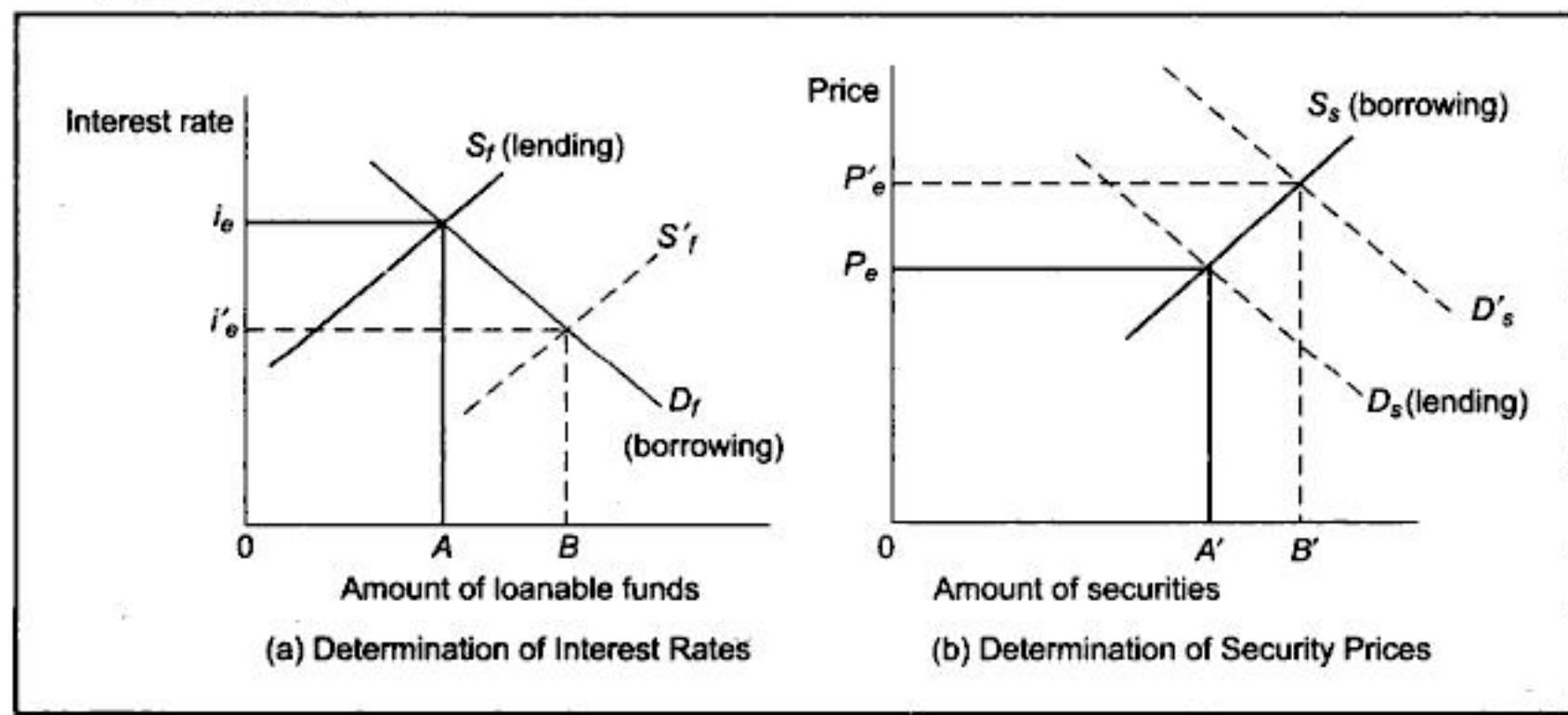
International Factors If India buys more (less) than it sells to other countries, it has a trade deficit (surplus). A trade deficit has to be financed through borrowings. Hence, the larger the trade deficit, the higher the level of borrowing which pushes the interest rates up. A trade surplus has the opposite effects.

Level of Business Activity When business activity expands the demand for funds increases which tends to push interest rates up. On the other hand, when business activity contracts, the demand for funds decreases which tends to push interest rates down.

2.5 EQUILIBRIUM IN FINANCIAL MARKETS

The supply and demand for various commodities (such as aluminium) are cleared at their respective equilibrium prices in real markets. Likewise, an equilibrium price clears the market for loanable funds. Put differently, at the equilibrium price, the supply and demand for loanable funds are matched. It is expressed as an interest rate—the amount per rupee per annum that the lender gets and the borrower pays. The supply of loanable funds (or equivalently the demand for securities) and demand for loanable funds (or equivalently the supply of securities) is depicted graphically in Exhibit 2.3.

Exhibit 2.3 Equilibrium in Financial Markets



As Exhibit 2.3(a) shows, the supply schedule of loanable funds (S_f) has a positive slope, implying that the lenders are willing to provide more funds as the interest rate rises. On the other hand, the demand schedule for loanable funds (D_f) has a negative slope, implying that the borrowers are willing to borrow more funds as the interest rate falls. Given the nature of these two schedules, the market for loanable funds will clear at i_e , the equilibrium rate of interest, and the amount of funds lent and borrowed will be equal to OA .

Exhibit 2.3(b) is the counterpart of Exhibit 2.3(a) in which the volume of securities substitutes the loanable funds on the horizontal axis and the price per security replaces the interest rate on the vertical axis. The demand schedule for securities (D_s) has a negative slope, implying that the investors are willing to buy more securities as the price falls. On the other hand, the supply schedule of securities (S_s) has a positive slope, implying that the borrowers are prepared to offer more securities as the price rises. Given the nature of these two schedules, the market for securities will clear at P_e , the equilibrium price, and the amount of securities exchanged will be equal to OA' . Note that OA in Exhibit 2.3(a) and OA' in Exhibit 2.3(b) are equal, if the same unit of measurement is used.

Suppose the supply schedule of loanable funds in Exhibit 2.3(a) shifts rightward and becomes S'_f , implying that at each rate of interest, the amount of loanable funds supplied increases. This results in a decrease in the equilibrium rate of interest from i_e to i'_e and an increase in the amount of loanable funds traded from OA to OB . The rightward shift in the supply schedule of loanable funds is paralleled by a rightward shift, to the same degree, in the demand schedule of securities (D_S to D'_S) in Exhibit 2.3(b). This leads to an increase in the equilibrium price of securities from P_e to P'_e along with an increase in the amount of securities exchanged from A' to B' .

Interest Rates in India Interest rates in India traditionally 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 paid by the central bank (RBI) on its short-term borrowings from banks. The *bank rate* is the rate at which the central bank lends to banks. 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 years 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.

The key interest rates in India at the end of 2006 were as follows:

■ Bank rate : 6.00 percent	■ 3-year bank deposit rate : 8.00 percent
■ Repo rate : 6.00 percent	■ Yield on 10-year Government bond : 7.54 percent
■ 364 day Treasury bill rate : 6.94 percent	■ Prime lending rate : 11.00 – 11.50 percent

2.6 ■ FINANCIAL INTERMEDIARIES

Financial intermediaries are firms that provide services and products that customers may not be able to get more efficiently by themselves in financial markets. A good example of a financial intermediary is a mutual fund which pools the financial resources of many people and invests in a basket of securities. It enjoys economies of scale in conducting research, in maintaining records, and in executing transactions. Hence it offers its customers a more efficient way of investing than what they can generally do on their own. The important products and services of financial intermediaries include checking accounts, savings accounts, loans, mortgages, mutual fund schemes, insurance contracts, credit rating, and so on.

Before we learn about various financial intermediaries in India, let us understand 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 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.

Key Financial Intermediaries

The key financial intermediaries in India are commercial banks, financial institutions, insurance companies, mutual funds, non-banking financial companies, and non-banking financial service companies.

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

Public sector banks, led by the State Bank of India, came into being largely on account of nationalisation of privately-owned commercial banks. Presently, they dominate the banking scene in the country. They have contributed immensely to wider geographical spread and deeper penetration in rural areas, higher mobilisation of deposits, and reallocation of bank credit to priority sectors.

Foreign banks, such as Citibank, have been in India for a long time and have been steadily 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.

Financial Institutions Since independence a number of financial institutions have been set up to cater to the long-term financing needs of the industrial sector and meet specialised financing requirements. An elaborate structure of financial institutions consisting of all-India term-lending institutions like IFCI, ICICI, and IDBI (the last two have transformed themselves into banks), State Financial Corporations, and State Industrial Development Corporations, has come into being.

There are many specialised financial institutions like Small Industries Development Bank of India (SIDBI), Export-Import Bank (EXIM Bank), National Bank for Agricultural and Rural Development (NABARD), Shipping Credit and Investment Corporation of India (SCICI), Power Finance Corporation (PFC), Rural Electrification Corporation (REC), Infrastructure Development Finance Company (IDFC), and National Housing Bank (NHB).

Insurance Companies Till recently there were just two insurance companies in India: the Life Insurance Corporation of India (LIC) and the General Insurance Corporation of India (GIC), the latter being a holding company with four fully-owned subsidiary companies in its fold. With the liberalisation of the insurance sector, many private sector players like ICICI-Prudential, Tata AIG, Bajaj ALLIANZ, Birla Sunlife, and HDFC Standard have set up insurance business in India. Insurance companies, LIC in particular, have massive resources at their command because insurance policies usually have a substantial element of savings and insurance premiums are payable in advance.

Mutual Funds A mutual fund is a collective investment vehicle. It mobilises resources from investors and invests in various types of securities. 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 public and private sector. In the last decade or so, private mutual funds like ICICI Prudential Mutual Fund, Reliance Mutual Fund, and Templeton Mutual Fund have grown impressively.

Non-Banking Financial Companies From mid-1980s many non-banking financial companies have come into being in the public sector as well as the private sector. Some of the well-known names are HDFC, Sundaram Finance, Kotak Mahindra Finance, ICICI Ventures, Infrastructure Leasing and Finance, and SBI Factors. These companies engage in a variety of activities like leasing finance, hire-purchase finance, housing finance, venture capital financing, factoring, and investment in securities.

Non-Banking Financial Services Companies This group consists of merchant banks, credit rating agencies, depositories, and others. *Merchant banks* are firms which help business, government, and other entities in raising finances. They also facilitate mergers, acquisitions, and divestitures. DSP Merrill Lynch, JM Morgan, ICICI Securities and SBI Capital Markets are among the leading merchant banks in India. *Credit rating agencies* rate debt and other instruments. CRISIL, CARE, and ICRA are the leading credit rating agencies in India. *Depositories* are institutions which dematerialise physical securities and effect transfer of ownership by electronic entries. Presently, there are two depositories in India, viz. the National Securities Depository Limited (NSDL) and the Central Securities Depository Limited (CSDL).

2.7 ■ REGULATORY INFRASTRUCTURE

As the 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 and the Securities Exchange Board of India.

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 function 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 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.

2.8 □ 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.

The impressive growth of the financial system in terms of quantitative indicators, however, was accompanied by deterioration in the quality of loan portfolio of financial institutions and banks. As L.M. Bhole says "The increasing politicisation of lending institutions and credit programmes, and the Government's gross interference in them have been progressively undermining the credit discipline and increasing the financial distress in India".² Fortunately, the reform and restructuring of banks and financial institutions and the appreciation of their investment portfolios has substantially improved their financial condition.

In the wake of the significant growth that has occurred in the Indian financial system, the financial development measures improved substantially over the last few decades. Overall, one can conclude that the Indian financial system is widening, deepening, maturing, and gaining in sophistication.

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

- 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.

² L.M. Bhole, *The Financial Institutions and Markets*, Tata McGraw-Hill Publishing Company Ltd, New Delhi, 1992.

- Financial intermediaries like the Industrial Development Bank of India, 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 intermediaries, prudential regulation and supervision (capital adequacy, disclosure, transparency, and so on) are being emphasised 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.

Financial Development Measures The financial development of a country is commonly assessed in terms of the following ratios.

$$\text{Finance ratio} = \frac{\text{Total financial claims}}{\text{National income}}$$

$$\text{Financial interrelations ratio} = \frac{\text{Total financial claims}}{\text{National income}}$$

$$\text{New issue ratio} = \frac{\text{Primary issues (claims created by non-financial sectors)}}{\text{Net physical capital formation}}$$

$$\text{Intermediation ratio} = \frac{\text{Issues of financial institutions}}{\text{Total financial issues in the economy}}$$

In terms of these ratios, India has steadily developed in the last six decades.

SUMMARY

- The **financial system** 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** such as bonds and stocks represent claims against the future income and wealth of others. **Financial liabilities** are the counterparts of financial assets.
- A **financial market** is a market for the creation and exchange of financial assets. Financial markets facilitate price discovery, provide liquidity, and reduce the cost of transacting.
- The **interest rate** on a loan or fixed income security depends on factors like the unit of account, maturity, and default risk.
- The **real interest rate** is the nominal **interest rate** adjusted for the inflation factor.

- The key determinants of the rates of return in a market economy are: expected productivity of capital, degree of uncertainty characterising the productivity of capital, time preferences of people, and degree of risk aversion.
- An **equilibrium price** clears the market for loanable funds.
- Financial intermediaries are firms that provide services and products that customers may not be able to get efficiently by themselves in financial markets.
- Financial intermediaries seem to offer several advantages: diversification, lower transaction cost, economies of scale, confidentiality, and signaling benefits.
- Commercial banks, term-lending financial institutions, insurance companies, mutual funds, provident funds, pension funds, non-banking finance companies, and merchant banks are the major financial intermediaries in India.
- The **Reserve Bank of India (RBI)** and the **Securities Exchange Board of India (SEBI)** are the major regulators of the financial system.

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. Which interest rates are regulated in India?
8. What were the key interest rates in India at the end of 2006?
9. What is the rationale of financial intermediaries?
10. Describe briefly various financial intermediaries in India.
11. What functions are performed by the Reserve Bank of India?
12. What are the principal tasks of the Securities Exchange Board of India?

PROBLEM

- 2.1 As a rule of thumb, real rates of interest are calculated by subtracting the inflation rate from the nominal rate. What is the error from using this rule of thumb for calculating real rates of return in the following cases.

Nominal rate (%)	5	10	20	60
Inflation rate (%)	2	4	10	40



Financial Statements, Taxes, and Cash Flow

Managers, shareholders, creditors, 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, the accountant prepares two principal statements, the balance sheet and the profit and loss account 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 profit and loss account 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 serve important functions: (a) They provide information on how the firm has performed in the past and what is its current financial position. (b) They are 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) They provide useful templates for financial forecasting and planning.

Financial statements are often an important source of information for financial decisions. So we examine financial statements in this chapter. Our emphasis is not on preparing financial statements—which is the job of accountants—but on understanding the kind of information found in these statements. We will pay special attention to the difference between accounting value and economic value and the difference between accounting income and cash flow.

This chapter provides a primer on financial statements, briefly touches on taxation, and explains how you can cull cash flow information from financial statements. It is divided into six sections as follows:

- Balance sheet
- Profit and loss account
- Statement of cash flows
- Manipulation of bottom line
- Taxes
- Free cash flow

3.1 ■ BALANCE SHEET

The balance sheet shows the financial condition of a business at a given point of time. As per the Companies Act, the balance sheet of a company shall be in either the account form or the report form. Exhibit 3.1 shows these forms; part A of this exhibit the account form and Part B the report form. Exhibit 3.2 shows the balance sheet of Horizon Limited as on March 31, 20X1 cast in the account as well as the report form. While the report form is most commonly used by companies, it is more convenient to explain the contents of the balance sheet of Horizon Limited, cast in the account form, as given in Exhibit 3.3.

Exhibit 3.1 Structure of Balance Sheet as per the Companies Act

<i>Account Form</i>	
<i>Liabilities</i>	<i>Assets</i>
<ul style="list-style-type: none"> ■ Share capital ■ Reserves and surplus ■ Secured loans ■ Unsecured loans ■ Current liabilities and provisions <ul style="list-style-type: none"> ■ Current liabilities ■ Provisions 	<ul style="list-style-type: none"> ■ Fixed assets ■ Investments ■ Current assets, loans and advances <ul style="list-style-type: none"> ■ Current assets ■ Loans and advances ■ Miscellaneous expenditures and losses
<i>Report Form</i>	
<ol style="list-style-type: none"> I. Sources of Funds <ol style="list-style-type: none"> 1. Shareholders' funds <ol style="list-style-type: none"> a) Share capital b) Reserves & surplus 2. Loan funds <ol style="list-style-type: none"> a) Secured loans b) Unsecured loans II. Application of Funds <ol style="list-style-type: none"> 1. Fixed assets 2. Investments 3. Current assets, loans and advances <p style="margin-left: 20px;">Less: Current liabilities and provisions</p> <p style="margin-left: 20px;">Net current assets</p> 4. Miscellaneous expenditure and losses 	

Liabilities

Liabilities, defined very broadly, represent what the firm owes others. A liability arises when a firm receives benefits or services and, in turn, promises to pay cash or provide goods and services in future.

Most liabilities are monetary liabilities, meaning that they require payments of specific amounts of cash. If the payment is due within a year or less, the liability is shown at the amount of cash the firm is expected to pay to discharge the obligation. If the payment dates extend beyond one year, the liability is shown at the present value of the future cash outflows. The discount rate used for valuing the future cash flows is the firm's interest rate on that liability.

Exhibit 3.2 Balance Sheet of Horizon Limited as on March 31, 20X1

Liabilities	A. Account Form			Rs. in million	
	20X1	20X0	Assets	20X1	20X0
Share capital	150	150	Fixed assets	330	322
Equity 150					
Preference —					
Reserves and surplus	112	106	Investments	15	15
Secured loans	143	131	Current assets, loans and advances	234	156
Unsecured loans	69	25	Miscellaneous expend- iture and losses	—	—
Current liabilities and provisions	105	81			
	<u>579</u>	<u>493</u>		<u>579</u>	<u>493</u>
<i>B. Report Form</i>					
				20X1	20X0
I. Sources of Funds					
1. Shareholders' funds				262	256
a) Share capital		150			
b) Reserves & surplus		<u>112</u>			
2. Loan funds				212	156
a) Secured loans		143			
b) Unsecured loans		<u>69</u>			
				<u>474</u>	<u>412</u>
II. Application of Funds					
1. Fixed assets				330	322
2. Investments				15	15
3. Current assets, loans and advances				234	156
Less: Current liabilities and provisions				105	81
Net current assets				129	75
4. Miscellaneous expenditures and losses				—	—
				<u>474</u>	<u>412</u>

**Exhibit 3.3 Balance Sheet of Horizon Limited as on March 31, 20X1
A Detailed Version**

Liabilities	20X1	20X0	Assets	(Rs. in million)	
				20X1	20X0
Share capital	150	150	Fixed assets		
Equity	150	150	(net)	330	322
Preference			Gross block	500	462
			Acc. depn.	170	140
Reserves and surplus	112	106	Investments	15	15
Secured loans	143	131	Current assets,		
Term loans	70	58	loans and advances	234	156
Cash credit	73	73	Cash at bank	10	6
Unsecured loans	69	25	Debtors	114	68
Bank credit	25	25	Inventories	105	72
Inter-corporate			Advances	5	10
deposits			Miscellaneous exp.		
Current liabilities			and losses		
and provisions	105	81			
Trade credit	75	60			
Advances	20	13			
Provisions	10	8			
	579	493		579	493

- Note that the working capital advance provided by banks is shown under secured loans or unsecured loans (depending on whether it is secured or not) and not under current liabilities and provisions.
- During the year the firm bought plant and machinery worth Rs. 38 million.

Some liabilities are non-monetary, meaning that the firm expects to discharge them by delivering goods or providing services, rather than by paying cash. For example, a magazine publisher may collect cash for subscriptions and promise delivery of magazines for many months to come. While the firm receives cash currently, it discharges its obligations by delivering the magazines in future. Such non-monetary liabilities are shown at the amount of cash received, rather than the expected cost of publishing the magazines.

The format prescribed in the Companies Act classifies liabilities as follows:¹

- Share capital
- Reserves and surplus

¹ In addition to these items, there is one more item that is now shown on the balance sheet: deferred tax liability. Thanks to the deferred tax accounting rule being followed now, the income tax provision consists of two items viz., current tax and deferred tax liability. The current tax is the income tax payable on the basis of the taxable income as computed under the Income Tax Act. The deferred tax liability arises on account of temporary differences (also known as timing differences) caused by items which are considered for calculating the taxable income (for income tax purposes) and accounting profit (for financial reporting purposes). For the sake of simplicity, we have ignored deferred tax liability.

- Secured loans
- Unsecured loans
- Current liabilities and provisions

Share Capital 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 the 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.

While the final figure shown against share capital is the paid up capital, the balance sheet also provides information on authorised capital, issued capital, subscribed capital, 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**; the part of issued capital which has been subscribed to by the investors is called the **subscribed capital**; the actual amount paid up is called the **paid-up capital**. Typically, the issued, subscribed, and paid up capital are the same.

Reserves and Surplus Reserves and surplus comprise retained earnings as well as non-earnings items like share premium and capital subsidy.

There are two broad kinds of reserves viz., capital reserves and revenue reserves. Capital reserves include items such as share premium account, revaluation reserve, and capital redemption reserve. A capital reserve cannot be distributed as dividend to shareholders. Revenue reserves represent accumulated retained earnings from the profits of the business. They are held in accounts like investment allowance reserve, dividend equalisation reserve, taxation reserve, and general reserves.

It is a common practice for companies to effect transfers from the profit and loss account to various reserve accounts. This process is called **appropriation**.

Surplus is the balance in the profit and loss account which has not been appropriated to any particular reserve account. Note that reserves and surplus along with paid up capital represent owners' equity, which is also called shareholders' funds or net worth.

Secured Loans Secured loans are loans that are secured by a charge on the assets of the firm. The charge may be created in the form of pledge or hypothecation of movable assets such as inventories and debtors and/or in the form of mortgage (usually equitable mortgage²) of immovable assets such as land, buildings, and plant and machinery (which are embedded to earth). The most common forms of secured loans in India are debentures, term loans, and working capital loans.

Unsecured Loans In contrast to secured loans, unsecured loans are loans which are not secured by a charge on the assets of the firm. The most common forms of unsecured loans in India are public deposits, commercial paper, unsecured loans from promoters, inter-corporate loans, and unsecured loans from commercial banks and financial institutions.

² In an equitable mortgage, the title of the property is deposited with the lender.

Current Liabilities and Provisions Broadly speaking, current liabilities and provisions represent obligations that are expected to mature within a year. As per the format prescribed under the Company's Act, current liabilities and provisions are divided into two sub - categories viz., current liabilities and provisions.

Current liabilities include items such as bills payable, sundry creditors, advance payments, and interest accrued but not due on loans. **Provisions** include items such as provision for taxes, provision for dividend, and provision for provident fund, gratuity, superannuation, and leave encashment.

Note that loans which are repayable within a year from the date of the balance sheet should also be part of current liabilities and provisions. However, in the format prescribed under the Companies Act, loans are shown separately under two categories viz., secured loans and unsecured loans. For managerial purposes, it makes sense to identify portions of loans, whether secured or unsecured, which are repayable within a year from the date of the balance sheet and include them under current liabilities and provisions.

Assets

Assets are resources 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 Companies Act:

- Fixed assets
- Investments
- Current assets, loans, and advances
- Miscellaneous expenditure and losses

Fixed Assets Fixed assets, also called noncurrent assets, are assets that are expected to produce benefits for more than one year. These assets may be tangible or intangible. Tangible fixed assets include items such as land, buildings, plant, machinery, furniture, and computers. Intangible fixed assets include items such as patents, copyrights, trademarks, and goodwill.

Tangible fixed assets 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—depreciation represents the allocation of the cost of a tangible fixed asset to various accounting periods that benefit from its use. Likewise, intangible fixed assets are reported at their net book value, which is simply the gross value less accumulated amortisation—amortisation represents the allocation of the cost of an intangible fixed asset to various accounting periods that benefit from its use.

Investments Investments represent financial securities owned by the firm. They are divided into two categories, viz., long-term investments and current investments.

Long-term 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 made for income

and control purposes. Long-term investments are stated at cost less any diminution of value which is regarded as permanent in the opinion of management.

Current investments generally 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.

One may argue that current investments, being short-term in nature, may be classified under the asset category current assets, loans, and advances. Under the format prescribed in the Companies Act, however, current investments have to be shown under the asset category investments.

Current Assets, Loans, and Advances This category consists of cash and other assets which get converted into cash, or which result in cash savings, during the operating cycle of the firm. The major components of current assets, loans, and advances are: inventories, sundry debtors, cash and bank balances, other current assets, and loans and advances.

- *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.
- *Sundry debtors* (also called accounts receivable) represent the amounts owed to the firm by its customers (who have bought goods and services on credit) and others. Sundry debtors are classified into two categories viz., debts outstanding for a period exceeding six months and other debts. Further, sundry debtors 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 sundry debtors is arrived at after deducting the provision for doubtful debts.
- *Cash and bank balances* comprise of cash on hand and balances with scheduled banks and non-scheduled banks.
- *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).
- *Loans and advances* comprise of items such as advances and loans to subsidiaries, advances recoverable in cash or in kind for value to be received, and deposits with governmental authorities. The net figure of loans and advances is arrived at after deducting a provision for doubtful advances, if any.

Miscellaneous Expenditure and Losses This category consists of two items (i) miscellaneous expenditure and (ii) loss or debit balance of profit and loss account.

- *Miscellaneous expenditure* comprises of items such as preliminary expenses, discount allowed on the issue of securities, interest paid out of capital during construction, and development expenditure to the extent not written off or adjusted.
- *Losses* are the debit balance of profit and loss account carried forward after deduction of the uncommitted reserves, if any.

Accounting Values versus Economic Values

Accounting values and economic values ought to be similar, at least in theory. In reality, however, the two diverge very often. There are three main reasons for such a discrepancy.

Use of the Historical Cost Principle For purposes of valuation, accountants use the historical cost as the basis. The value of an asset is shown at its historical cost less accumulated depreciation. Likewise, the value of a liability reflects a historical number. Hence accounting values differ significantly from current economic values.

Exclusion of Intangible Assets Intangible assets like technical know-how, brand equity, managerial capability, and goodwill with suppliers often have substantial economic value. Yet they are ignored in financial accounting because it is difficult to objectively value them.

Understatement or Omission of Certain Liabilities Firms usually understate or even wholly omit certain liabilities that are of a contingent nature. They may be mentioned by way of a footnote to the balance sheet but they are not recorded on the main balance sheet. Sometimes such liabilities are substantial.

3.2 ≡ PROFIT AND LOSS ACCOUNT

The Companies Act has prescribed a standard form for the balance sheet, but none for the profit and loss account. However, the Companies Act does require that the information provided should be adequate to reflect a true and fair picture of the operations of the company for the accounting period. The Companies Act has also specified that the profit and loss account must show specific information as required by Schedule IV.

The profit and loss account, like the balance sheet, may be presented in the account form or the report form. Typically, companies employ the report form. The report form statement may be a single-step statement or a multi-step statement. In a single step statement, all revenue items are recorded first, then the expense items are shown and finally the net profit is given. Exhibit 3.4 presents a single step profit and loss account for Horizon Limited for the year ending on March 31, 20X1.

Exhibit 3.4 Profit and Loss Account of Horizon Limited for the Year Ending on March 31, 20X1

	(Rs. in million)
Income	
Sales	701
Expenditure	
Material and other expenditure	582
Interest	21
Depreciation	30
Profit before tax	68
Provision for tax	34
Profit after tax	34

While a single step profit and loss account aggregates all revenues and expenses, a multi-step profit and loss account provides disaggregated information. Further, instead of showing only the final profit measure, viz., the profit after tax figure, it presents profit measures at intermediate stages as well. Exhibit 3.5 gives a multi-step profit and loss account for Horizon Limited for the year ending March 31, 20X1. The form given in this exhibit highlights the following:

**Exhibit 3.5 Profit and Loss Account of Horizon Limited for the Year
Ending on March 31, 20X1**

(Rs. in million)

	20X1	20X0
Net sales	701	623
Cost of goods sold	552	475
Stocks	421	
Wages and salaries	68	
Other manufacturing expenses	63	
Gross profit	149	148
Operating expenses	66	49
Depreciation	30	
General administration	12	
Selling	18	
Operating profit	89	99
Non-operating surplus/deficit	—	6
Profit before interest and tax	89	105
Interest	21	22
Profit before tax	68	83
Provision for tax	34	41
Profit after tax	34	42

- Net sales
- Cost of goods sold
- Gross profit
- Operating expenses
- Operating profit
- Non-operating surplus/deficit
- Profit before interest and tax
- Interest
- Profit before tax
- Tax
- Profit after tax
- Prior period adjustments
- Amount available for appropriations
- Appropriations
- Balance carried forward

Net Sales Net sales are generally defined as:

Sales – Sales returns – Sales tax/VAT/Excise duty

Sales are the sum of the invoice price of goods and services rendered during the period. Sales returns represent the invoice value of goods returned by the customers. Sales tax/VAT and excise duty represent the tax and duty paid to the government.

Cost of Goods Sold The Cost of Goods Sold (COGS), also called the cost of sales, represents the cost of goods sold during the accounting period. For a distribution firm, the COGS is the acquisition cost of inventories sold during the accounting period. For a manufacturing firm, the COGS consists of direct material costs, direct labour costs, and manufacturing overhead costs incurred for producing the goods sold during the accounting period. The COGS should be distinguished from the cost of production which represents the cost of goods produced during the accounting period.

Gross Profit Gross profit is the difference between net sales and the cost of goods sold. It is the first and the broadest measure of profit.

Operating Expenses Operating expenses are the expenses incurred by a firm for running its operations during the accounting period. General administration expenses, selling and distribution expenses, and depreciation are the major items of operating expenses. (Many accountants include depreciation under manufacturing overhead and treat it as part of the cost of goods sold, rather than as an operating expense. This treatment is also quite acceptable.)

Operating Profit Operating profit represents profit from operations after considering the cost of goods sold and operating expenses. It reflects the profit generated by the normal and recurring business activities of the firm and does not take into account non-operating gains (or losses), interest expenses, and taxes.

Non-operating Gains and Losses This item reflects the balance of gains and losses arising from transactions not related to the normal and recurring operating activities of the firm. Items like interest and dividend income, profit or loss from the sale of fixed assets and investments, restructuring expenses, and so on are included under this heading.

Profit Before Interest or Taxes Profit Before Interest and Taxes (PBIT), referred to also as Earnings Before Interest and Taxes (EBIT), is the operating profit of the firm plus any non-operating surplus less any non-operating loss. It is a measure of profit before considering interest expense and tax burden. It abstracts away the effect of debt policy (which determines the interest expense) as well as the tax code (which determines the tax burden). Hence, it is pre-eminently suitable for comparing profitability of firms with different debt policies and tax obligations.

Interest Interest is the periodic expense incurred for borrowings like term loans, debentures, working capital loans, commercial paper, fixed deposits, and unsecured loans provided by promoters. Remember that the interest income received on financial assets owned by the firm was included under non-operating surplus. Some firms, however, deduct the interest income on financial assets from the interest expense to arrive at the net interest expense which is shown here.

Profit Before Tax Profit before tax is the difference between the firm's profit before interest and tax and its interest expense. It is a measure of profit before taking taxes into account.

Income Tax Provision Thanks to the deferred tax accounting rule being followed now, the income tax provision consists of two items viz., current tax and deferred tax liability. The current tax is the income tax payable on the basis of taxable income as computed under the Income Tax Act. The deferred tax liability arises on account of temporary differences (also known as timing differences) caused by items which are considered for calculating the taxable income (for income tax purposes) and accounting profit (for financial reporting purposes).³ For the sake of simplicity we will assume that the income tax provision represents current tax.

Profit After Tax Profit after tax is obtained by subtracting the income tax provision from profit before tax. It is also called the net profit or the net income or the bottom line. When the profit after tax is positive the firm is said to be in the black; when it is negative, the firm is said to be in the red. Profit after tax is a measure of the change in the owners' equity arising from the revenues and expenses of the accounting period.

Prior Period Adjustments After the profit after tax is calculated some adjustments are made to arrive at the profit available for appropriation. The common adjustments involve adding the profit brought forward, adding the reserves written back, and subtracting extra burdens for previous years on items such as taxation.

Amount Available for Appropriations Profit available for appropriation is equal to profit after tax plus prior period adjustments.

Appropriations From the amount available for appropriations, transfers are made to various reserve accounts and provision is made for the proposed dividend.

Balance Carried Forward What is left after various appropriations represents the balance (or surplus) in the profit and loss account which is carried forward.

Net Cash Flow

When we looked at the profit and loss account, 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:

$$\begin{aligned} \text{Net cash flow} = & \text{Profit after tax} - \text{Non cash revenues} \\ & + \text{Non cash expenses} \end{aligned}$$

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 noncash expense is depreciation.

³ A firm can have a deferred tax asset as well on account of timing differences.

In practice, analysts defined the net cash flow as:

$$\text{Net cash flow} = \text{Profit after tax} + \text{Depreciation} + \text{Amortisation}$$

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

Accounting Income versus Economic Income

The economic income of a period is defined as the change in wealth during the period. Suppose you buy a share for Rs. 50 at the beginning of a year. If you receive a dividend of Rs. 2 and the price of the share moves up to Rs. 60 at the end of the year then the economic income from the share is Rs. 12, the increase in your wealth.

While it is easy to measure the change in the wealth of an investor, it is somewhat difficult to measure the change in the value of a firm. The profit and loss account represents the accountant's attempt to measure the change in the wealth of shareholders. Accounting income, however, diverges from economic income due to the following reasons.

Use of the Accrual Principle The accountant uses the accrual principle and not the cash principle. Hence the computation of accounting income is not based on cash flows, even though it is cash that really matters in the determination of economic income.

Omission of Changes in Value The accountant records only those changes in value which arise from definite transactions. He does not bother about things like development of new products, emergence of competition, and changes in regulation that significantly alter the future revenues and costs of the firm and, hence, its value.

Depreciation Economic depreciation represents the decline in the value of asset during the year. Since it is difficult to measure economic depreciation, the accountant often follows a fairly straight forward method for allocating the historical cost of the assets over its useful life. For example, under the straight line method—a commonly adopted method—the historical cost of the asset is allocated evenly over its life. Understandably, there is often a discrepancy between economic depreciation (loss of economic value) and accounting depreciation (allocation of historical cost using some arbitrary rule).

Treatment of R&D and Advertising Expenditures R&D expenditures increase a firm's technical know-how which enhances revenues and lowers costs in the future; likewise, advertising expenditures that build brand equity benefit the firm over a period of time. Hence these expenditures are akin to capital expenditures. Yet, for purposes of accounting, these expenditures are typically written off in the year in which they are incurred. This naturally causes a discrepancy between accounting income and economic income.

Inflation Inflation raises the market value of the firm's assets. However, under historical cost accounting this is not acknowledged. Hence, the depreciation charge is based on the historical cost, and not the replacement cost, of assets. This leads to a divergence between accounting income and economic income.

Creative Accounting Firms may manage their accounting income by resorting to various creative accounting techniques like change in the method of stock valuation, change in the

method and rate of depreciation, and sale and leaseback arrangement. Generally, the motive for creative accounting is to artificially boost the reported income. Obviously, such tactics cause a discrepancy between accounting income and economic income.

Unaudited Quarterly Financial Results

A listed company is required to furnish unaudited financial results on a quarterly basis within a month of expiry of the period to the stock exchange where the company is listed. Further, the company is required to advertise the details within 48 hours of the disclosure. The advertisement must appear in at least one national English daily and one regional newspaper published from where the registered office of the company is located.

The pro forma specified for such disclosure calls for providing the following details:

- Net sales/income from operations
- Other income
- Total expenditure
- Interest
- Gross profit/loss after interest but before depreciation, amortisation and taxation
- Depreciation and amortisation
- Profit before tax
- Provision for taxation
- Net profit/loss
- Paid-up equity capital and reserves excluding revaluation reserves (as per the balance sheet of the previous accounting year).

3.3 STATEMENT OF CASH FLOW

From a financial point of view, a firm basically generates cash and spends cash. It generates cash when it issues securities, raises a bank loan, sells a product, disposes an asset, so on and so forth. It spends cash when it redeems securities, pays interest and dividends, purchases materials, acquires an asset, etc. The activities that generate cash are called sources of cash and the activities that absorb cash are called uses of cash.

To understand how a firm has obtained cash and how it has spent cash during a given period, we need to look at the changes in each of the items in the balance sheet over that period. As an illustration, Exhibit 3.6 shows the balance sheets of Horizon Limited as on 31.3.20X0 and 31.3.20X1. The changes in various items of the balance sheet are noted in the last two columns of that exhibit.

Looking at Exhibit 3.6 we find that a number of things have changed over the year. For example, term loans increased by Rs. 12 million and fixed assets (net) increased by Rs. 8 million. Which of these changes represents a source of cash and which a use of cash? Our common sense tells us that a firm generates cash when it increases its liabilities (as well as owner's equity); on the other hand it uses cash when it buys assets or reduces its liabilities (as well owner's equity). Thus, the following picture emerges.

<i>Sources of Cash</i>	<i>Uses of Cash</i>
■ Increase in liabilities and owners' equity	Decrease in liabilities and owners' equity
■ Decrease in assets (other than cash)	Increase in assets (other than cash)

Exhibit 3.6 Changes in Balance Sheet Items

	<i>Part A: Changes in Balance Sheet Items</i>			
	Mar.31	Mar.31	Increase	Decreases
	20X1	20X0		
Owners' equity and liabilities				
Share capital				
Equity capital	150	150	—	—
Preference capital	—	—	—	—
Reserves & Surplus	112	106	6	—
Secured loans				
Term loans	70	58	12	—
Cash credit	73	73	—	—
Bank credit	25	25	—	—
Inter corporate deposit	44	—	44	—
Current liabilities & provisions				
Trade credit	75	60	15	—
Advance (taken)	20	13	7	—
Provisions	10	8	2	—
Total	<u>579</u>	<u>493</u>		
Assets				
Fixed assets (net)	330	322	8	—
Investments	15	15	—	—
Current asset, loans & advances				
Cash & bank	10	6	4	—
Debtors	114	68	46	—
Inventories	105	72	33	—
Advances	5	10	—	5
Miscellaneous expenditure & losses	<u>0</u>	<u>0</u>		
Total	<u>579</u>	<u>493</u>		

Using the above framework we can summarise the sources and uses of cash as follows:

<i>Sources</i>		<i>Uses</i>	
Increase in reserves and surplus	6	Increase in fixed assets (net)	8
Increase in term loans	12	Increase in debtors	46
Increase in inter-corporate deposit	44	Increase in inventories	33
Increase in trade credit	15		
Increase in advances (taken)	7		
Increase in provisions	2		
Decrease in advances (given)	5		
Total sources	<u>91</u>	Total uses	<u>87</u>
		Net addition to cash	<u>4</u>

Note that the net addition to cash in Rs. 4 million and it tallies with the Rs. 4 million change shown on the balance sheet.

This simple statement tells us a lot about what happened during the year, but it does not convey the full story. For example, the increase in reserves and surplus is equal to: profit after tax–dividends. If these are reported separately it would be more enlightening. Likewise, it would be more illuminating to know the break-up of net fixed asset acquisition in terms of gross assets acquisition and depreciation charge.

Drawing on profit and loss account for these details, the amplified statement is given below:

Sources		Uses	
Net profit	34	Dividend payment	28
Depreciation	30	Purchase of fixed assets	38
Increase in term loans	12	Increase in debtors	46
Increase in inter-corporate deposit	44	Increase in inventories	33
Increase in trade credit	15		
Increase in advances (taken)	7		
Increase in provisions	2		
Decrease in advances (given)	5		
Total sources	149	Total uses	145
		Net addition to cash	4

Classified Cash Flow Statement

The statement presented above lumped together all sources of cash and 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 viz., cash flows from operating activities, cash flows from investing activities, and cash flows from financing activities as shown in Exhibit 3.7.

Operating activities involve producing and selling goods and services. Cash inflows from operating activities include monies received from customers for sales of goods and services. Cash outflows from operating activities include payments to suppliers for materials, to employees for services, and to the government for taxes.

Investing activities involve acquiring and disposing fixed assets, buying and selling financial securities, and disbursing and collecting loans. Cash inflows from investing activities include receipts from the sale of assets (real as well financial), recovery of loans, and collection of dividend and interest. Cash outflows from investing activities include payments for the purchase of assets (real and financial) and disbursement of loans.

Financing activities involve raising money from lenders and shareholders, paying interest and dividend, and redeeming loans and share capital. Cash inflows from financing activities include receipts from issue of securities and from loans and deposits. Cash outflows from financing activities include payment of interest on various forms of borrowings, payment of dividend, retirement of borrowings, and redemption of capital.

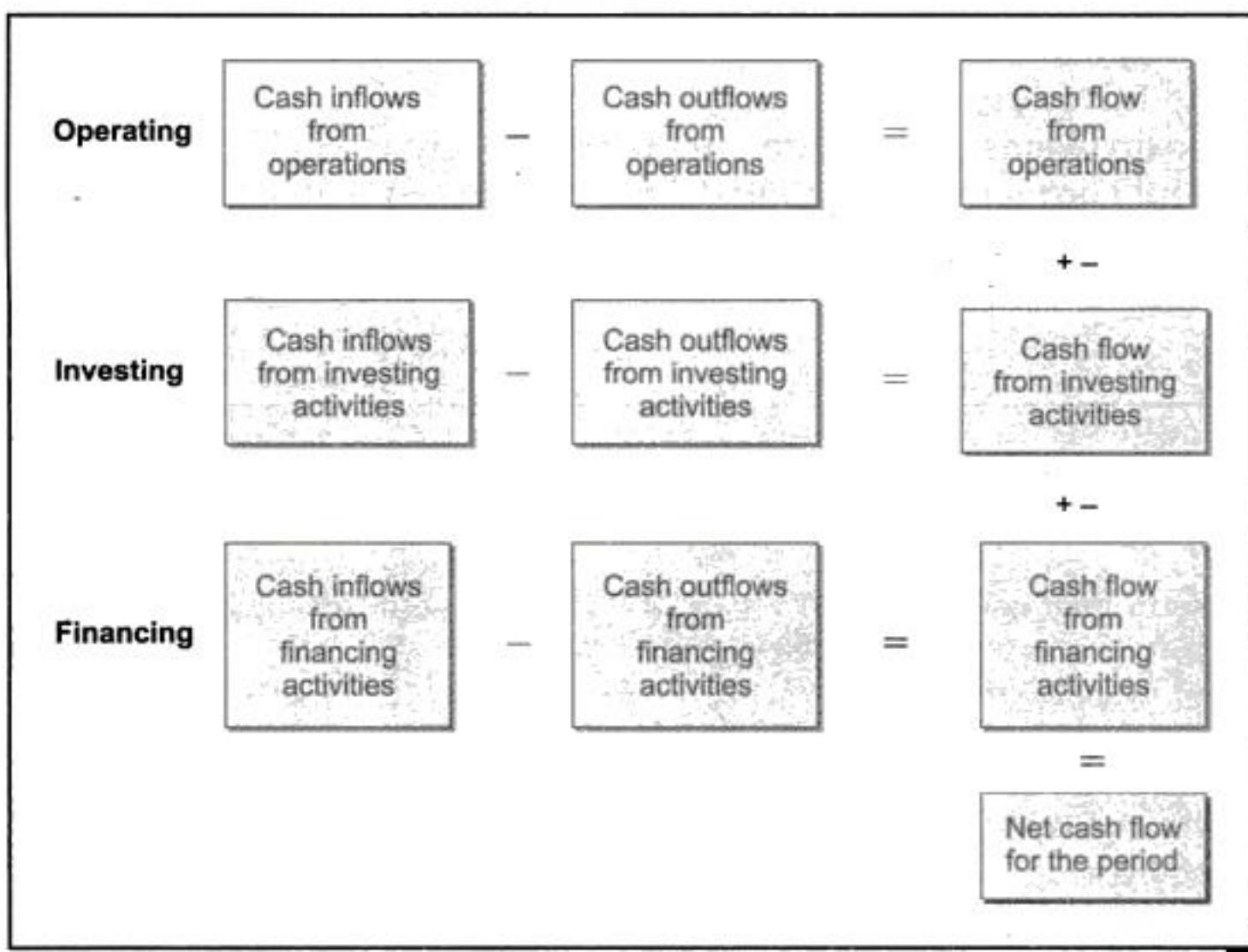
Exhibit 3.7 Components of Cash Flows

Exhibit 3.8 shows the cash flow statement of Horizon Limited for the period 1.4.20X0 to 31.3.20X1 prepared in conformity with the format prescribed by the Accounting Principles Board of the Institute of Chartered Accountants of India.

3.4 ⚡ MANIPULATION OF THE BOTTOM LINE

Financial statements reflect revenues, expenses, assets, liabilities, and owners' equity. Corporate managements have some discretion in influencing the occurrence, measurement, and reporting of these items. They may 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.
- 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).
- Change the method of stock valuation
- Capitalise certain expenses like research and development costs and product promotion costs that are ordinarily written off in the profit and loss account.
- Defer discretionary expenditures (like repairs, 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'.

Exhibit 3.8 Cash Flow Statement for Horizon Limited for the Period 1.4.20X0 to 31.3.20X1

	(Rs. in million)
(A) Cash Flow from Operating Activities	
Net profit before tax and extraordinary items	68
Adjustments for	
Interest paid	21
Depreciation	30
Operating profit before working capital changes	119
Adjustments	
Debtors	(46)
Inventories	(33)
Advances	5
Trade credit	15
Advances	7
Provisions	2
Cash generated from operations	69
Income tax paid	34
Cash flow before extraordinary items	35
Extraordinary item	—
Net cash flow from operating activities	35
(B) Cash Flow from Investing Activities	
Purchase of fixed assets	(38)
Net cash flow from investing activities	(38)
(C) Cash flow from Financing Activities	
Proceeds from term loans	12
Proceeds from inter-corporate deposits	44
Interest paid	(21)
Dividend paid	(28)
Net cash flow from financing activities	7
(D) Net Increase in Cash and Cash Equivalents : (A) + (B) + (C)	4
Cash and cash equivalents as on 1.04.20X0	6
Cash and cash equivalents as on 31.03.20X1	10

- Make extra provision during prosperous years and write them back in lean years.
- Revalue assets to create the impression of substantial reserves.
- Lengthen the accounting year in an attempt to cover poor performance.

Why Do Companies Manipulate or Smoothen Earnings A variety of motives prompt firms to manipulate or 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 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 indeed is your best safeguards against corporate accounting gimmickry.

3.5 ■ TAXES

Taxes are often 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 percent for domestic companies and 40 percent 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 percent and 100 percent) 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 any 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 percent 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 percent 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 state.

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 10.0 percent of its book profit, the tax payable shall be deemed to be 10.0 percent of such book profit. That is every company has to pay at least 10.0 percent 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.

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 percent of their estimated tax liability by June 15, 45 percent by September 15, 75 percent by December 15, and 100 percent 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 2008-2009, the individual tax rates are as follows:

Income Range	Tax Rate
Rs. 0 – Rs. 110,000	0 %
Rs. 110,001 – Rs. 150,000	10 %
Rs. 151,001 – Rs. 250,000	20 %
Rs. 250,001 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 listed shares and securities (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 percent. 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 10 percent 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, 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.

3.6 FREE CASH FLOW

Earlier we defined net cash flow as profit after tax plus adjustments for non cash items like depreciation and amortisation. One may be tempted to believe that management can dispose off the net cash flow in any manner it likes. However, this is not true because a company has to invest in fixed assets and working capital on a continuing basis to sustain its operations. Considering this business reality, we now define another term, viz., free cash flow. It is the cash flow available for distribution to investors (lenders and shareholders) after the firm has made investments in fixed assets and working capital to support its operations.

Note that the statement of cash flows, a standard financial accounting statement that we discussed earlier, is concerned with a different issue. It focuses on the net change in the cash and cash equivalent position of the firm. Don't confuse that with what is discussed in this section.

We have a balance sheet identity which says that the value of a firm's assets is equal to the value of its liabilities plus the value of its equity. In the same manner we have a cash flow identity which says that the cash flow from the assets of the firm is equal to the cash flow to lenders plus the cash flow to equity shareholders.

$$\text{Cash flow from assets} = \text{Cash flow to lenders} + \text{Cash flow to shareholders}$$

Cash Flow from Assets

Cash flow from assets is defined as:

$$\text{Operating cash flow} - \text{Net capital spending} - \text{Addition to net working capital}$$

Operating Cash Flow⁴ This refers to the cash flow generated by the day to day activities of manufacturing and selling. Financing expenses like interest charges and dividend payment are excluded as they are not operating expenses. Operating cash flow is defined as:

$$\text{Profit before interest and taxes} + \text{Depreciation} - \text{Taxes}$$

Note that in accounting practice, operating cash flow is often defined as: profit after tax plus depreciation. This means that interest paid is treated as an operating expense. In our definition, however, interest is excluded as it is a financing expense and not an operating expense.

The operating cash flow of Horizon Limited for 20X1 is:

$$89 + 30 - 34 = \text{Rs. 85 million}$$

Net Capital Spending This is simply the money spent on buying fixed assets less money received from selling fixed assets. It is defined as:

$$\text{Ending net fixed assets} - \text{Beginning net fixed assets} + \text{Depreciation}$$

The net capital spending for Horizon Limited for the year 20X1 is:

$$330 - 322 + 30 = \text{Rs. 38 million}$$

⁴ The term 'operating cash flow' has a different meaning than the term 'cash flow from operating activities' discussed in section 3.3.

Addition to Net Working Capital Apart from investing in fixed assets, a firm also has to invest in current assets. A portion of current assets is supported by current liabilities but the balance representing the net working capital (current assets – current liabilities) has to be financed by investor funds. The addition to net working capital can be determined by subtracting the beginning net working capital from the ending net working capital. The addition to net working capital for Horizon Limited for the year 20X1 is:

$$129 - 75 = \text{Rs. } 54 \text{ million}$$

Cash Flow from Assets Given the figures for various components of the cash flow from assets, the cash flow from assets is calculated below :

Operating cash flow	85
— Net capital spending	-38
— Addition to net working capital	-54
	<hr/>
	- Rs. 7 million

Cash Flow to Lenders and Shareholders

The total cash flow from assets must be equal to the sum of cash flow to lenders plus cash flow to shareholders.

Cash Flow to Lenders The cash flow to lenders is equal to :

$$\text{Interest paid} - \text{Net new borrowing}$$

The cash flow to lenders of Horizon Limited for 20X1 is equal to:

$$21 - 56 = -\text{Rs. } 35 \text{ million}$$

Cash Flow to Shareholders The cash flow to shareholders is equal to :

$$\text{Dividends paid} - \text{Net new equity raised}$$

The cash flow to shareholders of Horizon Limited for 20X1 is equal to:

$$28 - 0 = \text{Rs. } 28 \text{ million}$$

Hence the cash to lenders and shareholders is:

$$-35 + 28 = -\text{Rs. } 7 \text{ million}$$

Let us check out the cash flow identity. The cash flow from assets is -Rs. 7 million and the cash flow to lenders and shareholders too is -Rs. 7 million. So everything tallies. Exhibit 3.9 provides a summary of cash flow calculations.

In the above example, the free cash flow is -Rs. 7 million. This means that the net exchange between the firm on the one hand and the investors (lenders and shareholders) on the other hand is -Rs. 7 million. Put differently, on a net basis investors infused Rs. 7 million into the firm.

The importance of free cash flow stems from the fact that the value of a firm is equal to the present value of its future stream of free cash flows. Hence, managers interested in value creation must focus on improving the free cash flows.

Should a negative free cash flow be always considered bad? It depends. If the negative free cash flow is caused by a negative operating cash flow it is bad because it suggests that the firm is experiencing operating problems. On the other hand, if the negative free cash flow is caused by investments in fixed assets and working capital, it need not cause concern as long as these investments are expected to earn satisfactory returns. Indeed, rapidly growing firms do have negative free cash flows as they require external infusion of funds to support growth.

Exhibit 3.9 Cash Flow Summary
A. The cash flow identity

$$\text{Cash flow from assets} = \text{Cash flow to lenders} + \text{Cash flow to shareholders}$$

B. Cash flow from assets

$$\text{Cash flow from assets} = \text{Operating cash flow} - \text{Net capital spending} - \text{Change in net working capital}$$

where

$$\text{Operating cash flow} = \text{PBIT} - \text{Taxes} + \text{Depreciation}$$

$$\text{Net capital spending} = \text{Ending net fixed assets} - \text{Beginning net fixed assets} + \text{Depreciation}$$

$$\text{Change in net working capital} = \text{Ending net working capital} - \text{Beginning net working capital}$$

C. Cash flow to lenders

$$\text{Cash flow to lenders} = \text{Interest paid} - \text{Net new borrowing}$$

D. Cash flow to shareholders

$$\text{Cash flow to shareholders} = \text{Dividends paid} - \text{Net new share capital raised}$$

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 profit and loss account**) 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.
- To understand how cash flows have been influenced by various decisions, it is helpful to classify cash flows into three categories: cash flows from operating activities, cash flows from investing activities, and cash flows from financing activities.
- 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.

- We have a balance sheet identity which says that the value of a firm's assets is equal to the value of its liabilities plus the value of its equity. In the same manner we have a **cash flow identity** which says that:

Cash flow from assets = Cash flow to lenders + Cash flow to shareholders.

QUESTIONS

- List the important functions performed by the financial statements.
- Present the account form as well as the report form of the balance sheet.
- Describe the various asset accounts and liability accounts found on a company's balance sheet.
- "Accounting and economic values tend to differ". Why?
- Discuss the important items found on the profit and loss account.
- Explain the sources of divergence between accounting income and economic income.
- What are the sources of cash and what are the uses of cash?
- Give the format for the classified cash flow statement.
- What devices are commonly employed to manage the bottom line?
- Why do companies manipulate earnings?
- What are the salient features of corporate income tax?
- What are the salient features of individual income tax?
- Explain the cash flow identity.

SOLVED PROBLEMS

- 3.1 The financial statements of Matrix Limited are shown below:

Matrix Limited: Profit and Loss Account for the year ending 31st March 20X1

	(Rs. in Million)	
	20X1	20X0
Net sales	1065	950
Cost of goods sold	805	720
Stocks	600	520
Wages and salaries	120	110
Other manufacturing expenses	85	90
Gross profit	260	230
Operating expenses	90	75
Depreciation	50	40
Selling and general administration	40	35
Profit before interest and tax	170	155
Interest	35	30
Profit before tax	135	125
Tax	50	45
Profit after tax	85	80
Dividends	35	30
Retained earnings	50	50

Matrix Limited: Balance Sheet as at 31st March 20X1

	Rs. in million	20X1	20X0
<i>I. Sources of Funds</i>			
1. Shareholder's funds		505	455
(a) Share capital		125	125
(b) Reserve and surplus		380	330
2. Loan funds		280	260
(a) Secured loans		180	160
(i) Due after 1 year		130	135
(ii) Due within 1 year		50	25
(b) Unsecured loans		100	100
(i) Due after 1 year		60	70
(ii) Due within 1 year		40	30
Total		<u>785</u>	<u>715</u>
<i>II. Application of Funds</i>			
1. Net fixed assets		550	495
2. Investments		30	25
(a) Long term investments		20	20
(b) Current investments		10	5
3. Current assets, loans and advances		355	333
(a) Inventories		160	138
(b) Sundry debtors		120	115
(c) Cash and bank balances		25	20
(d) Loans and advances		50	60
Less : Current liabilities and provisions		150	138
Net current assets		<u>205</u>	<u>195</u>
Total		<u>785</u>	<u>715</u>

- (ii) Prepare the classified cash flow statement
- (iii) Prepare the cash flow identity

Solution

- (i) Classified Cash Flow Statement

Classified Cash Flow Statement for Matrix Limited for Period 1.4.20X0 to 31.3.20X1

A. Cash Flow from Operating Activities

Net profit before tax and extraordinary items

135

Adjustments for

Interest paid	35
Depreciation	50
Operating profit before working capital changes	220
Adjustments for	
Debtors	(5)
Inventories	(22)
Loans and advances	10
Current liabilities and provisions	12
Cash generated from operations	215
Tax paid	(50)
Net cash flow from operating activities	165
B. Cash Flow from Investing Activities	
Purchases of fixed assets	(105)
Net investment in marketable securities	(5)
Net cash flow from investing activities	(110)
C. Cash Flow from Financing Activities	
Proceeds from loans	20
Interest paid	(35)
Dividend paid	(35)
Net cash flow from financing activities	(50)
D. Net Increase in Cash and Cash Equivalents	5
Cash and cash equivalents as on 1.4.20X1	25
Cash and cash equivalents as on 1.4.20X0	20

(ii) Cash Flow Identity

The cash flow identity for the period 1.4.20X0 to 31.3.20X1 is as follows:

A. Cash flow from assets	= Operating cash flow – Net capital spending – Net investment in marketable securities – change in net working capital
Operating cash flow	= PBIT – Taxes + Depreciation = 170 – 50 + 50 = 170
Net capital spending	= Ending net fixed assets – Beginning net fixed assets + Depreciation = 550 – 495 + 50 = 105
Net investment in marketable securities	= Ending investments in marketable securities – Beginning investment in marketable securities = 30 – 25 = 5
Change in net working capital	= Ending net working capital – Beginning net working capital = 205 – 195 = 10
Cash flow from assets	= 170 – 105 – 5 – 10 = 50
Cash flow to lenders	Interest – Net new borrowing = 35 – 20 = 15
Cash flow to shareholders	Dividend paid – Net new share capital raised = 35

PROBLEMS

3.1 The comparative balance sheets of Laxmi Company are given below:

(Rs. in million)

<i>Owners' Equity and Liabilities</i>	<i>As on 31.3.20X0</i>	<i>As on 31.3.20X1</i>
Share capital	100	120
Reserves and surplus	140	160
Long-term debt	100	90
Short-term debt	60	80
Trade creditors	100	120
	500	570
<i>Assets</i>		
Fixed assets (net)	280	300
Inventories	120	140
Debtors	80	100
Cash	20	30
	500	570

The profit and loss account of Laxmi Company is given below:

Profit & Loss Account for the Period 1.4.20X0 to 31.3.20X1

Net sales	1200
Cost of goods sold	800
Gross profit	400
Operating expenses	220
• Selling, general, and administration	190
• Depreciation	30
Operating profit	180
Non-operating deficit	60
PBIT	120
Interest	30
PBT	90
Tax	30
PAT	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.
 (b) Develop the cash flow identity for the period 1.4.20X0 to 31.3.20X1.

3.2 The comparative balance sheets of Saraswati Company are given below:

(Rs. in million)

<i>Owners' Equity and Liabilities</i>	<i>As on 31.3.20X0</i>	<i>As on 31.3.20X1</i>
Share capital	50	50
Reserves and surplus	60	70
Long-term debt	95	80
Short-term bank borrowings	70	80
Trade creditors	50	60
Provisions	20	15
Total	345	355
<hr/>		
<i>Assets</i>		
Fixed assets (net)	180	190
Inventories	70	60
Debtors	60	70
Cash	20	15
Other assets	15	20
	345	355

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

Profit & Loss Account for the Period 1.4.20X0 to 31.3.20X1

Net sales	800
Cost of goods sold	520
Gross profit	280
Operating expenses	150
• Selling, general, and administration	130
• Depreciation	20
Operating profit	130
Non-operating deficit	50
PBIT	80
Interest	30
Profit before tax	50
Tax	20
Profit after tax	30
Dividends	20
Retained earnings	10

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



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II

FINANCIAL ANALYSIS AND PLANNING

4

Analysis of Financial Statements

5

Financial Planning and Forecasting

Analysis of Financial Statements

In the previous chapter, we looked at the contents of the financial statements and pointed towards the danger of imputing economic significance to 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.

While information found in published financial statements is often not enough to form conclusive judgments about firm performance, financial statements do provide important clues about what needs to be examined in greater detail. Analysis of financial statements is of interest to lenders (short-term as well as long-term), investors, security analysts, managers, corporate boards, regulators, 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. It is helpful in assessing corporate excellence, judging creditworthiness, forecasting bond ratings, predicting bankruptcy, and assessing market risk.

This chapter discusses how information can be extracted from financial statements for analysing financial performance. It is divided into six sections:

- Financial ratios
- Du Pont analysis
- Standardised financial statements
- Applications of financial analysis
- Using financial statements analysis
- Going beyond the numbers

4.1 ■ FINANCIAL RATIOS

The financial statements of Horizon Limited are given in Exhibits 4.1 and 4.2. If you want to compare the financial statements of Horizon Limited with those of other companies,

you would have a problem because of differences in size. One way of avoiding this problem is to calculate and compare financial ratios—remember a ratio eliminates the size problem as the size effectively divides out.

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. Financial ratios have been classified in several ways. For our purposes, 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 Horizon Limited: Profit and Loss Account for the Year
Ending 31st March 20X1**

	(Rs. in million)	
	20X1	20X0
Net sales	701	623
Cost of goods sold	552	475
Stocks	421	370
Wages and salaries	68	55
Other manufacturing expenses	63	50
Gross profit	149	148
Operating expenses	60	49
Depreciation	30	26
General administration	12	11
Selling	18	12
Operating profit	89	99
Non-operating surplus/deficit	—	6
Profit before interest and tax	89	105
Interest	21	22
Profit before tax	68	83
Tax	34	41
Profit after tax	34	42
Dividends	28	27
Retained earnings	6	15
Per share data (in rupees)		
Earning per share	2.27	2.80
Dividend per share	1.80	1.80
Market price per share	21.0	20.0
Book value per share	17.47	17.07

Exhibit 4.2 Horizon Limited: Balance Sheet as on 31st March 20X1

	(Rs. in million)	
	20X1	20X0
I. Sources of funds		
1. Shareholders' funds	262	256
(a) Share capital	150	150
(b) Reserves and surplus	112	106
2. Loan funds		
(a) Secured loans	143	131
(i) Due after 1 year	108	29
(ii) Due within 1 year	35	40
(b) Unsecured Loans	69	25
(i) Due after 1 year	29	10
(ii) Due within 1 year	40	15
	474	412
II. Application of funds		
1. Fixed assets	330	322
2. Investments	15	15
(a) Long term investments	12	12
(b) Current investments	3	3
3. Current assets, loans and advances	234	156
(a) Inventories	105	72
(b) Sundry debtors	114	68
(c) Cash and bank balance	10	6
(d) Loans and advances	5	10
Less: Current liabilities and provisions	105	81
Net current assets	129	75
	Total	474
		412

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:

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

Current assets include cash, current investments, debtors, inventories (stocks), loans and advances, and pre-paid expenses. Current liabilities represent liabilities 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 $237/180 = 1.32$

Normally, a high current ratio is considered to be a sign of financial strength. Bankers in India have used a norm of 1.33. Internationally, the norm is 2.0. However, in the last decade or so, a number of firms have tried to achieve a zero or even a negative working capital position by managing their inventories tightly and obtaining longer credit from their suppliers. For example, Hindustan Lever Limited has a negative net working capital position, thereby leading to a current ratio of less than one. Obviously, in such a case, a less-than-one current ratio cannot be considered to be a sign of financial weakness. Rather, it reflects superior financial management.

In interpreting the current ratio, the composition of current assets must not be overlooked—perhaps inventories may be slow-moving and a portion of loans and advances may represent dues from associate companies which may be sticky.

Acid-test Ratio Also called the quick ratio, the acid-test ratio is defined as:

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

Quick assets are defined as current assets excluding inventories.

Horizon's acid-test ratio for 20X1 is:

$$(237 - 105) / 180 = 0.73$$

This is a fairly stringent measure of liquidity as it excludes inventories, perhaps the least liquid of current assets, from the numerator.

Cash Ratio Sometimes, financial analysts look at cash ratio, which is defined as:

$$\frac{\text{Cash and bank balances} + \text{Current investments}}{\text{Current liabilities}}$$

Horizon's cash ratio for 20X1 is:

$$(10 + 3) / 180 = 0.07$$

This is a very stringent measure of liquidity. Indeed lack of immediate cash may not matter if the firm can stretch its payments or borrow money at short notice. Aren't financial managers quite skillful at these things?

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 is defined as:

$$\frac{\text{Debt}}{\text{Equity}}$$

The numerator of this ratio consists of all debt¹, short-term as well as long-term, and the denominator consists of net worth plus preference capital plus deferred tax liability².

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

$$212 / 262 = 0.809$$

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

- The book value of equity may be an understatement of its true value in a period of rising prices. This happens because assets are carried at their historical values less depreciation, not at current values.
- 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.

A variant of this ratio is **total outside liabilities to tangible net worth ratio**, which is considered very important by commercial banks. Total outside liabilities are equal to debt, as defined above plus deferred tax liability. Tangible net worth is equal to: paid-up capital + reserves and surplus – miscellaneous expenditure and losses.

Debt-asset Ratio The debt-asset ratio measures the extent to which borrowed funds support the firm's assets. It is defined as:

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

The numerator of this ratio includes all debt, short-term as well as long-term, and the denominator of this ratio is the total of all assets (the balance sheet total).

Horizon's debt-asset ratio for 20X1 is:

$$212 / 474 = 0.45$$

This ratio is related to the debt-equity ratio as follows:

$$\frac{\text{Debt}}{\text{Assets}} = \frac{\text{Debt}/\text{Equity}}{1 + \text{Debt}/\text{Equity}} \quad (4.1)^3$$

¹ Alternatively, the ratio of long-term debt to equity may be calculated.

² For simplicity, preference capital and deferred tax liability are considered equity.

³ Equation (4.1) is derived as follows:

Since assets are equal to equity plus debt

$$\frac{\text{Debt}}{\text{Assets}} = \frac{\text{Debt}}{\text{Equity} + \text{Debt}}$$

Dividing both the numerator and the denominator of the right-hand side of this equation by equity,

$$\frac{\text{Debt}}{\text{Assets}} = \frac{\frac{\text{Debt}}{\text{Equity}}}{\frac{\text{Equity}}{\text{Equity}} + \frac{\text{Debt}}{\text{Debt}}} = \frac{\frac{\text{Debt}}{\text{Equity}}}{1 + \frac{\text{Debt}}{\text{Equity}}}$$

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:

$$89/21 = 4.23$$

Note that profit before interest and taxes are used in the numerator of this ratio because the ability of a firm to pay interest is not affected by tax payment, as interest 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 earnings before interest and taxes suffer a considerable decline. A low interest coverage ratio may result in financial embarrassment when earnings before interest and taxes decline. 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 earnings before interest and taxes. In view of this, we may use a modified interest coverage ratio:

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

Horizon's modified interest coverage ratio for 20X1 is: $119/21 = 5.67$.

Fixed Charges Coverage Ratio This ratio shows how many times the cash flow before interest and taxes covers all fixed financing charges. It is defined as:

$$\frac{\text{Profit before interest and taxes} + \text{Depreciation}}{\text{Interest} + \frac{\text{Repayment of loan}}{1 - \text{Tax rate}}}$$

In the denominator of this ratio only the repayment of loan is adjusted upwards for the tax factor because the loan repayment amount, unlike interest, is not tax deductible. Horizon's tax rate has been assumed to be 50 percent.

Horizon's fixed charges coverage ratio⁴ for 20X1 is:

$$\frac{119}{21 + \frac{75}{0.50}} = 0.70$$

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.⁵

⁴ From the balance sheet we find that Rs. 75 million loan funds are repayable within one year.

⁵ A ratio along these lines is :

$$\frac{\text{Earnings before depreciation interest and lease payments}}{\text{Debt interest} + \text{Lease payments} + \frac{\text{Loan repayment instalment}}{(1 - \text{Tax rate})} + \frac{\text{Preference dividends}}{(1 - \text{Tax rate})}}$$

The fixed charge coverage ratio has to be interpreted with care because short-term loan funds like working capital loans and commercial paper tend to be self-renewing in nature and hence do not have to be ordinarily repaid from cash flows generated by operations. Hence, a fixed charge coverage ratio of less 1 need not be viewed with much concern.

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

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

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 sales or cost of goods sold, and levels of various assets. The important turnover ratios are: inventory turnover, average collection period, receivables turnover, 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:

$$\frac{\text{Cost of goods sold}}{\text{Average inventory}}$$

Horizon's inventory turnover for 20X1 is:

$$\frac{552}{(105 + 72)/2} = 6.24$$

The inventory turnover reflects the efficiency of inventory management. The higher the ratio, the more efficient 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.

Note that as inventories tend to change over the year, we use the average of the inventories at the beginning and the end of the year. *In general, averages may be used when a flow figure (such as, cost of goods sold) is related to a stock figure (inventories).*

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

$$\frac{\text{Net credit sales}}{\text{Average sundry debtors}}$$

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

Horizon's debtors' turnover for 20X1 is:

$$701 \div [(114 + 68)/2] = 7.70$$

Obviously, the higher the debtors' turnover the greater 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 sundry debtors. It is defined as:

$$\frac{\text{Average sundry debtors}}{\text{Average daily credit sales}}$$

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

Horizon's average collection period for 20X1 is:

$$[(114 + 68)/2] \div (701/365) = 47.4 \text{ days}$$

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:

$$\frac{\text{Net sales}}{\text{Average net fixed assets}}$$

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

$$701 \div [(330 + 322)/2] = 2.15$$

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:

$$\frac{\text{Net sales}}{\text{Average total assets}}$$

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

$$701 \div [(474 + 412)/2] = 1.58$$

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 margin 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, operating profit margin, and net profit margin. *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 The gross profit margin ratio is defined as:

$$\frac{\text{Gross profit}}{\text{Net sales}}$$

Gross profit is defined as the difference between net sales and cost of goods sold.

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

$$149/701 = 0.21 \text{ or } 21 \text{ percent}$$

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.

EBITDA Margin The EBITDA margin is defined as:

$$\frac{\text{Earnings before interest, taxes, depreciation, and amortisation}}{\text{Net sales}}$$

Horizon's EBITDA margin for 20X1 is; $119/701 = 0.17$ or 17 percent

This ratio shows the margin left after meeting manufacturing expenses, selling, general, and administration expenses (SG&A). It reflects the operating efficiency of the firm.

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

$$\frac{\text{Net profit}}{\text{Net sales}}$$

Horizon's net profit margin ratio for 20X1 is: $34/701 = 0.049$ or 4.9 percent

This ratio shows the earnings left for shareholders (both equity and preference) as a percentage of net sales. It measures the overall efficiency of production, administration, selling, financing, pricing, 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:

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

Horizon's ROA for the year 20X1 is:

$$34 \div [(412 + 474) / 2] = 7.7 \text{ percent}$$

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:

$$89 \div [(412 + 474)/2] = 0.201 \text{ or } 20.1 \text{ percent}$$

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 is defined as:

$$\text{ROCE} = \frac{\text{Profit before interest and tax} (1 - \text{Tax rate})}{\text{Average total assets}}$$

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:

$$89 (1 - 0.5) \div [(412 + 474)/2] = 0.101 \text{ or } 10.1 \text{ percent}$$

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 (ROE) is defined as:

$$\frac{\text{Equity earnings}}{\text{Average equity}}$$

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

Horizon's return on equity for 20X1 is:

$$34 \div [(262 + 256)/2] = 0.131 \text{ or } 13.1 \text{ per cent}$$

The return on equity measures the profitability of equity funds invested in the firm. Because maximising shareholder wealth is the dominant financial objective, ROE is the most important measure of performance in an accounting sense. It is influenced by several factors: earning power, debt-equity ratio, average cost of debt funds, and tax rate. Because ROA and ROE are commonly used measure, you must remember that they are accounting rates of return. Hence these measures may be properly referred to as *return on book assets* and *return on book equity*.

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 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, 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 earnings per share is simply: profit after tax less preference dividend divided by the number of outstanding equity shares.

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

$$21.0 / 2.27 = 9.25$$

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 the degree of liquidity.

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

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

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, if it is in the form of traded debt securities, its market value can be observed. If the debt is in the form of loans, 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:

$$\frac{15 \times 21 + 212}{119} = 4.43$$

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:

$$21.00 / 17.47 = 1.20$$

In a 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 total yield, are equal.⁶

Q Ratio Proposed by James Tobin, the *q* ratio is defined as:

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

The *q* ratio resembles the market value to book value ratio. However, there are two key differences: (i) The numerator of the *q* ratio represents the market value of equity as well

⁶ The following analysis proves this point:

Let B_0 = book value per share at the beginning of the year

E_1 = earnings per share for the year

D_1 = dividends per share for the year

R_1 = retained earnings per share for the year = $E_1 - D_1$

B_1 = book value per share at the end of the year = $B_0 + E_1 - D_1$

M_0 = market price per share at the beginning of the year = B_0

M_1 = market price per share at the end of the year = B_1

Return on equity = E_1/B_0

Earnings-price ratio = $E_1/M_0 = E_1/B_0$

$$\text{Market yield} = \frac{D_1 + (M_1 - M_0)}{M_0} = \frac{D_1 + B_1 - B_0}{B_0}$$

$$= \frac{D_1 + (B_0 + E_1 - D_1) - B_0}{B_0} = \frac{E_1}{B_0}$$

as debt, not just equity. (ii) The denominator of the q ratio represents all assets. Further these assets are reckoned at their replacement cost, not book value.

Comparison with Industry Averages

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).

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

Exhibit 4.3 Comparison of Ratios of Horizon Limited with Industry Average

Ratio	Formula	Horizon Limited	Industry Average
Liquidity			
■ Current ratio	$\frac{\text{Current assets}}{\text{Current liabilities}}$	1.32	1.26
■ Acid-test ratio	$\frac{\text{Quick assets}}{\text{Current liabilities}}$	0.73	0.69
Leverage			
■ Debt-equity ratio	$\frac{\text{Debt}}{\text{Equity}}$	0.81	1.25
■ Debt-ratio	$\frac{\text{Debt}}{\text{Assets}}$	0.45	0.56
■ Interest coverage ratio	$\frac{\text{EBIT}}{\text{Interest}}$	4.23	4.14
Turnover			
■ Inventory turnover	$\frac{\text{Net sales}}{\text{Average inventory}}$	6.24	6.43
■ Accounts receivable turnover	$\frac{\text{Net credit sales}}{\text{Average accounts receivable}}$	7.70	7.50
■ Fixed assets turnover	$\frac{\text{Net sales}}{\text{Average net fixed assets}}$	2.15	2.23
■ Total assets turnover	$\frac{\text{Net sales}}{\text{Average total assets}}$	1.582	1.26
Profitability			
■ Gross profit margin	$\frac{\text{Gross profit}}{\text{Net sales}}$	21.0%	18.0%
■ Net profit margin	$\frac{\text{Net profit}}{\text{Net sales}}$	4.9%	4.0%

(Contd.)

Ratio	Formula	Horizon Limited	Industry Average
■ Return on assets	$\frac{\text{Net profit}}{\text{Average total assets}}$	7.7%	6.9%
■ Earning power	$\frac{\text{PBIT}}{\text{Average total assets}}$	20.1%	17.7%
■ Return on capital employed	$\frac{\text{PBIT} (1 - T)}{\text{Average total assets}}$	10.1%	8.8%
■ Return on equity	$\frac{\text{Equity earnings}}{\text{Average net worth}}$	13.1%	11.9%
Valuation			
■ Price-earnings ratio	$\frac{\text{Market price per share}}{\text{Earnings per share}}$	9.25	9.26
■ Yield	$\frac{\text{Dividend} + \text{Price change}}{\text{Initial price}}$	14.0%	14.1%
■ Market value to book value ratio	$\frac{\text{Market price per share}}{\text{Book value per share}}$	1.20	1.16

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 lower 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 are also higher than the industry average.
- The valuation ratios of Horizon Limited compare slightly favourably in relation to industry average.

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 in detecting secular changes and avoiding 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 for three years in succession but deteriorated in the last year.
- The total assets turnover ratio remained more or less the same.

- The net profit margin ratio improved impressively in the second year but subsequently declined somewhat steeply over the remaining three years.
- The return on equity followed the pattern of the net profit margin ratio.
- The price-earnings ratio deteriorated steadily over time except in the last year.

Exhibit 4.4 Time Series of Certain Financial Ratios

	1	2	3	4	5
Debt-equity ratio	0.91	0.98	0.65	0.61	0.81
Total asset turnover ratio	1.51	1.59	1.58	1.53	1.58
Net profit margin (%)	8.8	11.6	9.8	6.6	4.9
Return on equity (%)	25.4	30.7	24.5	16.7	13.1
Price-earnings ratio	18.6	15.3	10.3	7.1	9.3

4.2 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.

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

$$\frac{\text{Net profit}}{\text{Average total assets}} = \frac{\text{Net profit}}{\text{Net sales}} \times \frac{\text{Net sales}}{\text{Average total assets}} \quad (4.2)$$

$$\text{ROA} \qquad \qquad \qquad \text{NPM} \qquad \qquad \qquad \text{TATR}$$

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

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.

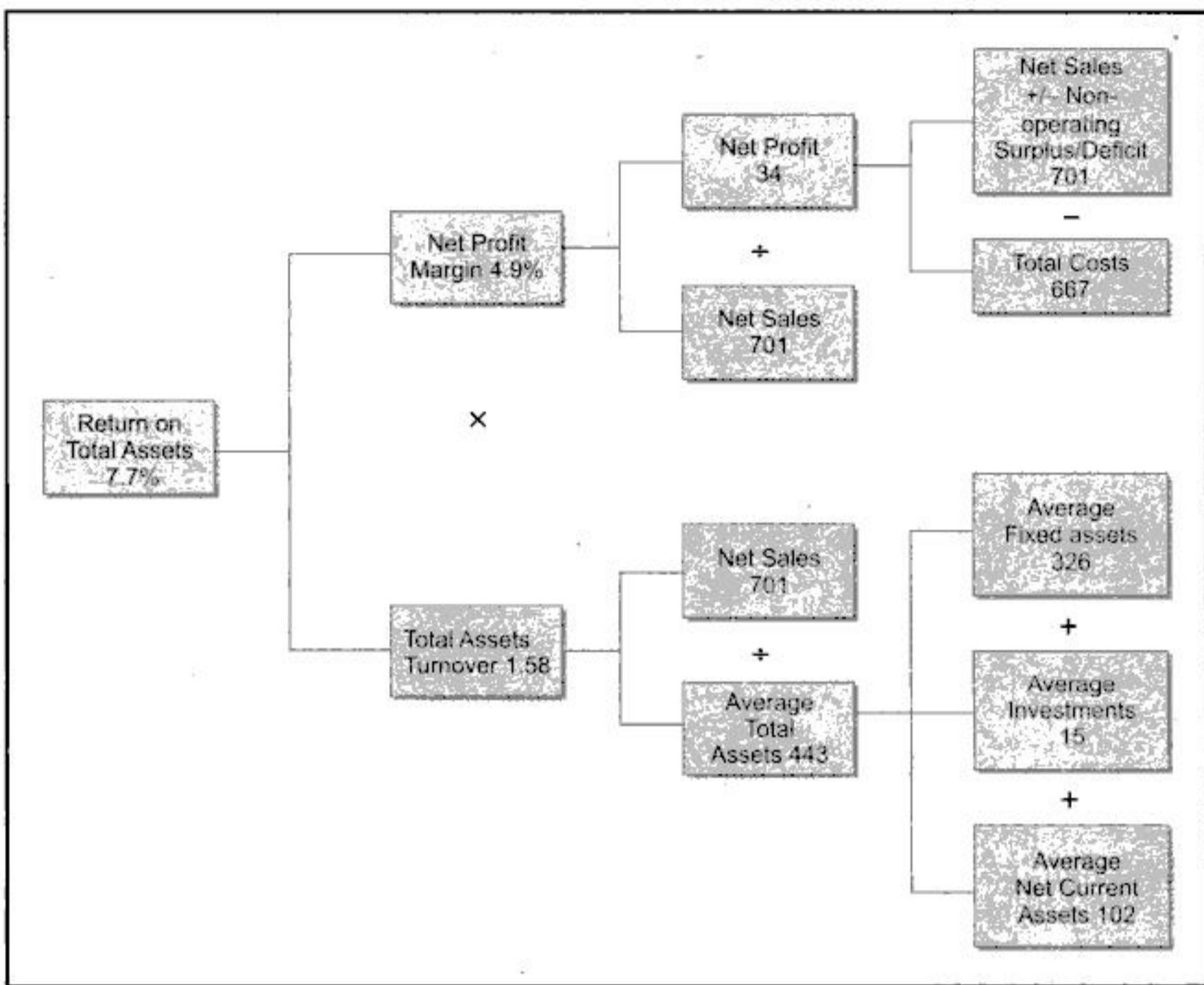
The lower side of the Du Pont chart throws light on the determinants of the total assets turnover ratio. If this is supplemented by a study of component turnover ratios (inventory turnover, debtors' turnover, and fixed assets turnover), a deeper insight can be gained into efficiencies/inefficiencies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

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

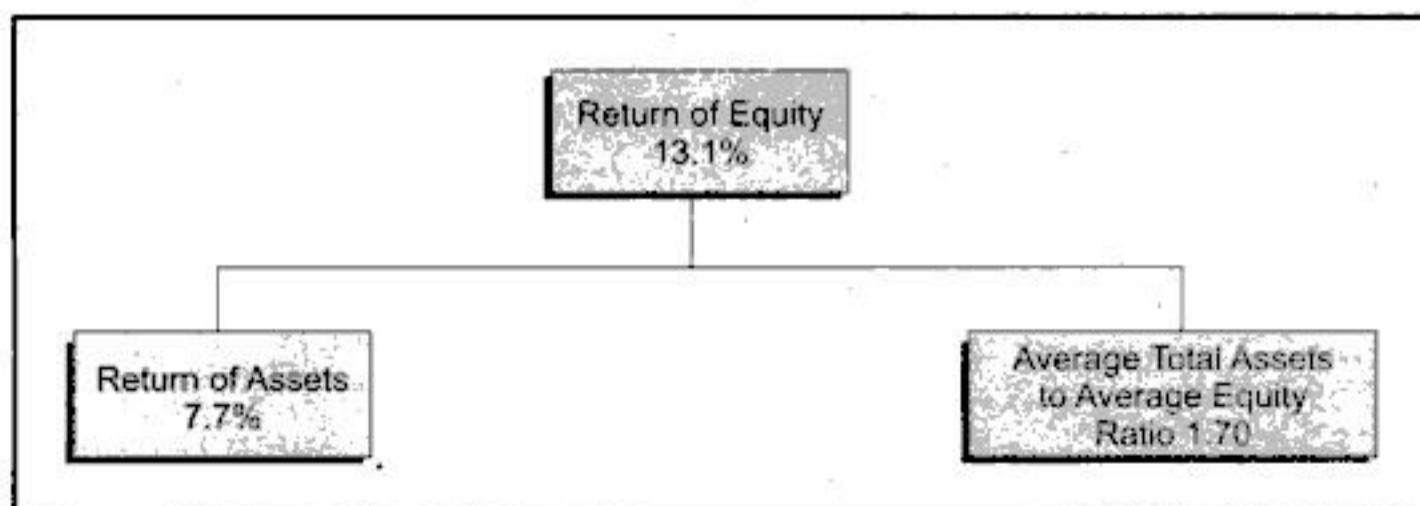
$$\frac{\text{Net profit}}{\text{Average equity}} = \frac{\text{Net profit}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Average total assets}} \times \frac{\text{Average total assets}}{\text{Average equity}} \times \frac{1}{(1 + \text{Debt/Equity})} \quad (4.3)$$

$$\text{ROE} \qquad \qquad \qquad \text{NPM} \qquad \qquad \qquad \text{TATR} \qquad \qquad \qquad (1 + \text{Debt/Equity})$$

The third component on the right hand side of Eq (4.3) may be called the equity multiplier.

Exhibit 4.5 Du Pont Chart Applied to Horizon Limited


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

Exhibit 4.6 Extension of Du Pont Chart


4.3 STANDARDISED FINANCIAL STATEMENTS

As an analyst, you would like to compare the financial statements of Horizon Limited to those of other companies. You would have a problem, however, because companies often differ considerably in size. For example, Hindustan Lever and Nirma are very different in size, so it is difficult to compare their financial statements directly. Even for the same company, if its size changes over time, it is difficult to compare financial statements at different times.

For meaningful comparison, you can standardise the financial statements. A simple way to do this is to work with percentages, rather than rupees. We discuss below some ways of doing this.

Common Size Financial Statements A useful and convenient way of standardising financial statements is to express each item on the profit and loss account as a percentage of sales and each item on the balance sheet as a percentage of total assets. The resulting financial statements are called common size statements.

The common size profit and loss accounts and the common size balance sheets of Horizon Limited are shown in Part A and Part B of Exhibit 4.7.

Exhibit 4.7 Common Size Financial Statements

<i>Part A: Profit and Loss Account</i>				
	<i>Regular (in million)</i>		<i>Common Size (%)</i>	
	<i>20X0</i>	<i>20X1</i>	<i>20X0</i>	<i>20X1</i>
■ Net sales	Rs. 623	Rs. 701	100	100
■ Cost of goods	475	552	76	79
■ Gross profit	148	149	24	21
■ PBIT	105	89	17	13
■ Interest	22	21	4	3
■ PBT	83	68	13	10
■ Tax	41	34	7	5
■ PAT	42	34	7	5

<i>Part B: Balance Sheet</i>				
	<i>Regular (in million)</i>		<i>Common Size (%)</i>	
	<i>20X0</i>	<i>20X1</i>	<i>20X0</i>	<i>20X1</i>
■ Shareholders' funds	256	262	62	55
■ Loan funds	156	212	38	45
■ Total	412	414	100	100
■ Fixed assets	322	330	78	70
■ Investments	15	15	4	3
■ Net current assets	75	129	18	27
■ Total	412	474	100	100

Common Base Year Financial Statements Suppose you are looking at the financial statements of a company over a period of time and trying to figure out trends in revenues, profits, net worth, debt, and so on. A useful way of doing this is to select a base year and

then express each item relative to the amount in the base year. The resulting statements are called common base year financial statements.

Exhibit 4.8 presents the common base year profit and loss account and balance sheet of Horizon Limited. For example, the common base year value for net sales for year 20X1 is 113. This means that net sales have increased 13 percent over their base year (20X0) value. Other numbers can be similarly interpreted.

Exhibit 4.8 Common Base Year Financial Statements

<i>Part A: Profit and Loss Account</i>					
	<i>Regular (in million)</i>		<i>Common Size (%)</i>		
	20X0	20X1	20X0	20X1	
■ Net sales	Rs. 623	Rs. 701	100	113	
■ Cost of goods sold	475	552	100	116	
■ Gross profit	148	149	100	101	
■ PBIT	105	89	100	85	
■ Interest	22	21	100	95	
■ PBT	83	68	100	82	
■ Tax	41	34	100	83	
■ PAT	42	34	100	81	

<i>Part B: Balance Sheet</i>					
	<i>Regular (in million)</i>		<i>Common Size (%)</i>		
	20X0	20X1	20X0	20X1	
■ Shareholders' funds	Rs. 256	Rs. 262	100	102	
■ Loan funds	156	212	100	136	
Total	412	474	100	115	
■ Fixed assets	322	330	100	102	
■ Investments	15	15	100	100	
■ Net current assets	75	129	100	172	
Total	412	474	100	115	

4.4 APPLICATIONS OF FINANCIAL ANALYSIS

Having learnt how to compute and interpret a number of financial ratios, let us now examine how a set of financial ratios may be combined to answer some questions that are commonly raised by financial managers and others.

Assessing Corporate Excellence Every year, the Economic Times gives corporate excellence award for the Company of the year and the Emerging Company of the year. The Economic Times considers the following financial indicators in its quantitative evaluation for judging corporate excellence:

- Increase in market capitalisation over the 12-month period on the date of calculation.
- Increase in revenues over one accounting year.
- Increase in profit after tax over one accounting year.
- Return on net worth.
- Compound annual growth in EPS over the past three years.

- Price-earnings ratio.
- Market capitalisation as on July 15.
- Sales for the latest financial year.
- Profit after tax for the latest financial year.

The determination of the top 20 companies in each category is based on a combined ranking over the nine indicators which are equally weighted.

To judge corporate excellence, other studies have employed different sets of financial indicators. Exhibit 4.9 shows the indicators employed in some other studies.

Exhibit 4.9 Indicators to Judge Corporate Excellence

Peters and Waterman: In Search of Excellence

- Compound asset growth
- Compound equity growth
- Market value to book value ratio
- Return on total capital
- Return on equity
- Return on sales

Industrial Development Bank of India Study

- Growth rate of sales
- Growth rate of assets
- Profit before tax to capital employed
- Working capital to gross sales
- Dividend coverage
- Debt-equity ratio

Judging Creditworthiness For assessing the creditworthiness of a potential customer or client, a number of ad hoc scoring models employing several financial variables have been used. One such model is shown in Exhibit 4.10. In this model you assess a client on various factors by assigning points in the range of 0–15. By looking at the total points you judge the creditworthiness of the client.

Forecasting Bankruptcy A multivariate model of the kind displayed in Exhibit 4.10 represents a distinct improvement over a single ratio analysis. It seems to comprehensively consider almost all the key factors relevant for credit evaluation. A critical look at this model, however, raises several issues: Why should the model have eleven factors? What is the sanctity about the scale of rating? Why should the factors be regarded equally important? Is there any conceptual framework or theory that supports such scoring? In sum, the approach seems to be ad hoc.

To overcome some of these limitations, the modern approach to financial analysis employs multivariate statistical techniques. What is the key difference between scientific multivariate analysis and ad hoc multivariate analysis? In scientific multivariate analysis, the selection of variables, the form of the model, the scheme of weighting, and the determination of cut off levels (wherever it is done) are guided largely by objective statistical methodology, not subjective managerial judgment.

Exhibit 4.10 A Credit Scoring Model

Reputation				
Character	On time	Up to 30 days late	Up to 60 days late	
■ Average past payment				—
Capacity				
■ Profit margin	0-5%	6-10%	>10%	—
■ Quick ratio	< 0.75	0.75-1.25	> 1.25	—
■ Cash flow	Low	Average	High	—
Capital				
■ Current ratio	< 1	1-1.15	> 1.5	—
■ Debt-equity ratio	< 1	1-2	> 2	—
■ Interest earned	< 2X	2X-3X	> 3X	—
Collateral				
■ Net worth	Low	Average	High	—
■ Per cent assets free	Low	Average	High	—
■ Market value to net worth	Low	Average	High	—
Conditions	Recession	Average	Prosperity	—
		Total		—

A widely cited example of scientific multivariate analysis is the classic study by Altman⁷ on prediction of corporate bankruptcy. In this study Altman examined a sample of 33 bankrupt firms with a pair of 33 non-bankrupt firms. He considered 22 accounting and non-accounting variables in various combinations as predictors of failure. He found that the following function discriminated best between the bankrupt and non-bankrupt firms:

$$\begin{aligned}
 Z = & 1.2 \frac{\text{Working capital}}{\text{Total assets}} + 1.4 \frac{\text{Retained earnings}}{\text{Total assets}} \\
 & + 3.3 \frac{\text{Earnings before interest and taxes}}{\text{Total assets}} + 0.6 \frac{\text{Market value of equity}}{\text{Book value of debt}} \\
 & + 1.0 \frac{\text{Sales}}{\text{Total assets}} \quad (4.5)
 \end{aligned}$$

Altman found that firms which had a Z score below 1.81 almost went bankrupt, firms which had a Z score value above 2.99 remained healthy, and firms which had a Z score between 1.81 and 2.99 fell in a grey area.

Valuing Equity Shares Numerous studies have been conducted to empirically relate the price-earnings multiple to key financial variables. Typically these studies have employed

⁷ Edward I. Altman, "Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy", *Journal of Finance* (September 1968).

cross-section regression analysis. For example, in one of the pioneering studies conducted in the US, Whitbek and Kisor found the following relationship:

$$\begin{aligned} \text{Price-earnings multiple} = & 8.2 + 1.5 \text{ Growth rate in earnings} \\ & + 6.7 \text{ Payout ratio} - 0.2 \text{ Variability in earnings} \end{aligned} \quad (4.6)$$

Predicting Bonds Ratings In the US, Moody's bond ratings and Standard and Poor's bond ratings are most widely used. Naturally, financial managers are interested in guessing the ratings the bonds of their firms would get from these agencies. Hence, a question that concerns them is: Can financial ratios be used for predicting bond ratings? Empirical research suggests that the answer to this question is a 'yes'.

In a path-breaking study Kalpan and Urwitz found that, in general, a lower debt ratio, a higher interest coverage ratio, a higher return on assets ratio, a larger size, a lower market risk, and a lower unique risk had a favourable influence on bond ratings. They combined these variables into a single measure of bond quality and examined how well it could predict Moody's ratings. As Exhibit 4.11 shows, they found a very close correspondence between predicted ratings and actual ratings for a sample of newly issued bonds.

Exhibit 4.11 Predicted Ratings and Actual Ratings for a Sample of Newly Issued Bonds

Actual Ratings	Predicted Ratings						Total
	Aaa	Aa	A	Baa	Ba	B	
Aaa	2						2
Aa	2	2	5				9
A		1	33	2			36
Baa			8	7			15
Ba				1			1
B					1		1
Total	4	3	46	10	1		64

Source R.S. Kaplan and G. Urwitz, "Statistical Models of Bond Ratings: A Methodological Inquiry," *Journal of Business*, Vol. 52, (April 1979).

Estimating Market Risk The market risk of a company's stock, as measured by beta, is an important determinant of the return required by investors. To estimate a stock's beta you need sufficient history of stock price data. Since this may not always be available, financial economists examined whether accounting data can be used to get a handle over equity beta. For example, economic logic tells us that if the debt-equity ratio is high, other things being equal, equity beta is also high. No wonder, empirical evidence supports such a relationship.

You can also calculate the "accounting beta" of a firm. It reflects the sensitivity of the firm's earnings changes to changes in the aggregate earnings of all firms.

Instead of looking at one measure at a time, you can look at a combination of several of them. For example, Hochman found that the debt ratio, dividend yield, and accounting

beta when combined provide an estimate of a stock's equity beta which is as good as that obtained from stock's price history.

4.5 ■ USING 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.

Problems in Financial Statement Analysis

You have to cope with the following problems while analysing financial statements.

Lack of an Underlying Theory The basic problem in financial statement analysis is that there is no theory that tells us which numbers to look at and how to interpret them. In the absence of an underlying theory financial statement analysis appears to be ad hoc, informal, and subjective. As Horrigan put it: "From a negative viewpoint, the most striking aspect of ratio analysis is the absence of an explicit theoretical structure... As a result the subject of ratio analysis is replete with untested assertions about which ratios should be used and what their proper levels should be."

Conglomerate Firms Many firms, particularly the large 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 ratios and some unfavourable ratios—and this is rather common. In such a situation, it may be somewhat difficult to form an overall judgment about its financial strength or weakness. Multiple discriminant analysis, a statistical tool, may be employed to sort out the net effect of several ratios pointing in different directions.

Correlation among Ratios Notwithstanding the previous observation, financial ratios of a firm often show a high degree of correlation. Why? This is because several ratios have some common element (sales, for example, is used in various turnover ratios) and several items tend to move in harmony because of some common underlying factor. In view of ratio correlations, it is redundant and often confusing to employ a large number of ratios in financial statement analysis. Hence it is necessary to choose a small group of ratios from a large set of ratios. Such a selection requires a good understanding of the meaning and limitations of various ratios and an insight into the economics of the business.

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 footnotes:** Footnotes sometimes contain valuable information. They may reveal things that management may try to hide. The more difficult it is to read a footnote, the more information—laden it may be.
- 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.

4.6 GOING BEYOND THE NUMBERS

The tools of analysis discussed in this chapter are helpful in making business decisions, evaluating performance, and forecasting future developments.

Comprehensive business analysis, however, calls for going beyond the conventional financial measures to consider qualitative factors relevant for evaluating the performance and prospects of a company. The American Association of Individual Investors (AAII) has summarised these factors as follows:

1. *Are the company's revenues tied to one key customer?* If so, the company's performance may decline dramatically if the customer goes elsewhere. On the other hand, if the relationship is firmly entrenched, this might actually stabilise sales.
2. *To what extent are the company's revenues tied to one key product?* Companies that rely on a single product may be more efficient and focused, but a lack of diversification increases risk. If revenues come from several different products, the overall bottom line will be less affected by a drop in the demand for any one product.
3. *To what extent does the company rely on a single supplier?* Depending on a single supplier may lead to unanticipated shortages, which investors and potential creditors should consider.
4. *What percentage of the company's business is generated overseas?* Companies with a large percentage of overseas business are often able to realise higher growth and larger profit margins. However, firms with large overseas operations find that the value of their operations depends in large part on the value of the local currency. Thus, fluctuations in currency markets create additional risks for firms with large overseas operations. Also, the potential stability of the region is important.
5. *Competition.* Generally, increased competition lowers prices and profit margins. In forecasting future performance, it is important to assess both the likely actions of the current competition and the likelihood of new competitors in the future.
6. *Future prospects.* Does the company invest heavily in research and development? If so, its future prospects may depend critically on the success of new products in the pipeline. For example, the market's assessment of a computer company depends on how next year's products are shaping up. Likewise, investors in pharmaceutical companies are interested in knowing whether the company has developed any potential blockbuster drugs that are doing well in the required tests.
7. *Legal and regulatory environment.* Changes in laws and regulations have important implications for many industries. For example, when forecasting the future of tobacco companies, it is crucial to factor in the effects of proposed regulations and pending or likely lawsuits. Likewise, when assessing banks, telecommunications firms, and electric utilities, analysts need to forecast both the extent to which these industries will be regulated in the years ahead, and the ability of individual firms to respond to changes in regulation.

SUMMARY

- **Financial ratio analysis**, the principal tool of financial statement analysis, is a study of ratios between 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. **Current ratio** and **acid-test ratio** are the important liquidity ratios.
- **Leverage** refers to the use of debt finance. **Debt-equity ratio**, **interest coverage ratio**, and **fixed charges coverage ratio** are the important leverage ratios.
- **Turnover** refers to the efficiency of asset use. **Inventory turnover ratio**, **receivables turnover ratio**, **fixed assets turnover ratio**, and **total assets turnover ratio** are the important turnover ratios.
- **Profitability** reflects the final result of business operations. **Gross profit margin**, **net profit margin** **return on assets**, **earning power**, **return on capital employed**, and **return on equity** are the most important profitability ratios.
- **Valuation** refers to the assessment of the firm by the capital market. **Price-earnings ratio** and **market value—book value ratio** are the most important valuation ratios.
- For judging whether the ratios are high or low, **cross-section analysis** and **time-series analysis** are used.
- In **common size analysis**, the items in the balance sheet are stated as percentages of total assets and the items in the profit and loss account are stated as percentages of sales.
- According to **Du Pont analysis**, return on equity is expressed as a product of net profit margin, total asset turnover, and asset-equity ratio.
- Properly combined, financial ratios may be used to assess corporate excellence, judge creditworthiness, predict bankruptcy, value equity shares, predict bond ratings, and measure market risk.
- 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 judgment.
- Comprehensive business analysis calls for going beyond conventional financial measures to consider qualitative factors relevant for evaluating the performance and prospects of a company.

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 assets, earning power, return on capital employed, and return on equity.

7. Discuss the key valuation ratios.
8. "If the market price per share is equal to the book value per share, the following are equal: return on equity, earnings price ratio, and total yield." Prove.
9. What is the difference between common size analysis and common base year analysis?
10. Discuss the Du Pont analysis.
11. Carry out the Du Pont analysis for a company of your choice.
12. Describe the Altman model for predicting corporate bankruptcy.
13. Discuss the problems and issues faced in financial statement analysis.
14. What guidelines would you follow in financial statement analysis ?
15. What issues are regarded as important by the American Association of Individual Investors?

SOLVED PROBLEMS

- 4.1 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.

- 4.2 Determine the sales 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 = $1,600 \times 1.4 = 2,240$
Current assets – Inventories	= Current liabilities × Acid-test ratio = $1,600 \times 1.2 = 1,920$
Inventories	= $2,240 - 1,920 = 320$
Sales	= Inventories × Inventories turnover ratio = $320 \times 8 = 2,560$

- 4.3 The following ratios are given for Mintex Company

Net profit margin ratio	4 percent
Current ratio	1.25
Return on net worth	15.23 percent
Total debt to total assets ratio	0.40
Inventory turnover ratio	25

Complete the following statements

Profit and Loss Account

	Rs.
Sales	_____
Cost of goods sold	_____
Operating expenses	700
Profit before interest and tax	_____
Interest	45
Profit before tax	_____
Tax provision (50 percent)	_____
Profit after tax	_____

Balance Sheet

Net worth	_____	Fixed assets	_____
Long-term debt (10 percent interest)	_____	Current assets	180
Short-term debt (10.42 percent interest)	_____	Cash	_____
		Receivables	60
		Inventory	_____

Solution The blanks in the above statements may be filled as follows:

- (a) *Short-term debt* The value of short-term debt—the only current liabilities—is derived as follows.

$$\text{Current ratio} = \frac{\text{Current assets}}{\text{Current liabilities}} = 1.25$$

$$\text{Current liabilities} = \frac{\text{Current assets}}{1.25} = \frac{180}{1.25} = 144$$

So short-term debt is 144.

- (b) *Long-term debt* The long-term debt carries 10 percent interest rate. Hence the long-term debt is equal to

$$\frac{\text{Interest} - .10 \times 144}{0.10} = \frac{45 - 15}{0.10} = 300$$

- (c) *Total assets* As the ratio of total debt to total assets is 0.4, total assets (the total of the balance sheet) is simply:

$$\frac{\text{Total debt}}{0.4} = \frac{144 + 300}{0.4} = 1110$$

- (d) *Net worth* The difference between total assets and total debt represents the net worth. Hence, it is equal to:

$$1110 - (444) = 666$$

(e) *Fixed assets* The difference between total assets and current assets represents fixed assets. So,

$$\text{Fixed assets} = 1110 - 180 = 930$$

(f) *Profit after tax* This is equal to:

$$(\text{Net worth}) (\text{Return on net worth}) = (666) (0.1523) = 101.4$$

(g) *Tax* As the tax rate is 50 per cent, the tax provision is simply equal to the profit after tax, i.e., 101.4

(h) *Profit before tax* The sum of the profit after tax and the tax provision is equal to the profit before tax. So, it is equal to:

$$101.4 + 101.4 = 202.8$$

(i) *Profit before interest and taxes* This is equal to the profit before tax plus the interest payment. Hence, it is equal to :

$$202.8 + 45 = 247.8$$

(j) *Sales* The figure of sales may be derived as follows :

$$\frac{\text{Profit after tax}}{\text{Net profit margin ratio}} = \frac{101.4}{0.04} = 2535$$

(k) *Cost of goods sold* This figure of cost of goods sold may be derived from the following accounting identity :

$$\text{Sales} - \text{cost of goods sold} - \text{operating expenses} = \text{EBIT}$$

$$2535 - \text{cost of goods sold} - 700 = 247.8$$

Hence the cost of goods sold figure is 1587.2

(l) *Inventory* This is equal to :

$$\frac{\text{Sales}}{\text{Inventory turnover ratio}} = \frac{2535}{25} = 101.4$$

(m) *Cash* This may be obtained as follows :

$$\text{Current assets} - \text{receivables} - \text{inventory} = 180 - 60 - 101.4 = 18.6$$

4.4 The financial statements of Matrix Limited are given below :

Matrix Limited : Profit and Loss Account for the Year Ending 31st March 20X1

(Rs. in Million)

	20X1	20X0
Net sales	1065	950
Cost of goods sold	805	720
Stocks	600	520
Wages and salaries	120	110
Other manufacturing expenses	85	90
Gross profit	260	230
Operating expenses	90	75
Depreciation	50	40
Selling and general administration	40	35
Profit before interest and tax	170	155
Interest	35	30

(Contd.)

	20X1	20X0
Profit before tax	135	125
Tax	50	40
Profit after tax	85	80
Dividends	35	30
Retained earnings	50	50

Matrix Limited : Balance Sheet as at 31st March 20X1

	<i>Rs. in Million</i>	
	20X1	20X0
<i>I. Sources of Funds</i>		
1. Shareholder's funds	505	455
(a) Share capital	125	125
(b) Reserve and surplus	380	330
2. Loan funds	280	260
(a) Secured loans	180	160
(i) Due after 1 year	130	135
(ii) Due within 1 year	50	255
(b) Unsecured loans	100	100
(i) Due after 1 year	60	70
(ii) Due within 1 year	40	30
	Total	785
	715	
<i>II. Application of Funds</i>		
1. Net fixed assets	550	495
2. Investments	30	25
(a) Long term investments	20	20
(b) Current investments	10	5
3. Current assets, loans and advances	355	333
(a) Inventories	160	138
(b) Sundry debtors	120	115
(c) Cash and bank balances	25	20
(d) Loans and advances	50	60
Less : Current liabilities and provisions	150	13
Net current assets	205	195
	Total	785
	715	

- a. Calculate the following ratios

- Current ratio
- Acid-test ratio
- Cash ratio
- Debt-equity ratio
- Interest coverage ratio
- Fixed charges coverage ratio
- Inventory turnover ratio
- Debtors turnover ratio

- Average collection period
- Fixed assets turnover
- Total assets turnover
- Gross profit margin
- Net profit margin
- Return on assets
- Earning power
- Return on equity

b. Set up the Dupont equation

Solution

$$\text{a. Current ratio} = \frac{\text{Current assets, loans and advances} + \text{Current investments}}{\text{Current liabilities and provisions} + \text{Short term debt}}$$

$$= \frac{355 + 10}{150 + 90} = 1.52$$

$$\text{Acid-test ratio} = \frac{\text{Quick assets}}{\text{Current liabilities}} = \frac{365 - 160}{240} = 0.85$$

$$\text{Cash ratio} = \frac{\text{Cash and bank balances} + \text{Current investments}}{\text{Current liabilities}} = \frac{25 + 10}{240} = 0.15$$

$$\text{Debt-equity ratio} = \frac{\text{Debt}}{\text{Equity}} = \frac{280}{505} = 0.55$$

$$\text{Interest coverage ratio} = \frac{\text{PBIT}}{\text{Interest}} = \frac{170}{35} = 4.9$$

$$\text{Fixed charges coverage ratio} = \frac{\frac{\text{PBIT} + \text{Depreciation}}{\text{Interest}}}{\frac{\text{Repayment of loan}}{1 - \text{Tax rate}}} = \frac{\frac{170 + 50}{35}}{\frac{90}{1 - .37}} = 1.24$$

$$\text{Inventory turnover} = \frac{\text{Cost of goods sold}}{\text{Average inventory}} = \frac{805}{(160 + 138)/2} = 5.40$$

$$\text{Debtors turnover} = \frac{\text{Net credit sales}}{\text{Average debtors}} = \frac{1065}{(120 + 115)/2} = 9.06$$

$$\text{Average collection period} = \frac{365}{\text{Debtors turnover}} = \frac{365}{9.06} = 40.3 \text{ days}$$

$$\text{Fixed assets turnover} = \frac{\text{Net sales}}{\text{Average net fixed assets}} = \frac{1065}{(550 + 495)/2} = 2.04$$

$$\text{Total assets turnover} = \frac{\text{Net sales}}{\text{Average total assets}} = \frac{1065}{(785 + 715)/2} = 1.42$$

$$\text{Gross profit margin} = \frac{\text{Gross profit}}{\text{Net sales}} = \frac{260}{1065} = 24.4\%$$

$$\text{Net profit margin} = \frac{\text{Net profit}}{\text{Net sales}} = \frac{85}{1065} = 7.98\%$$

$$\text{Return on assets} = \frac{\text{Net profit}}{\text{Average total assets}} = \frac{85}{(785 + 715)/2} = 11.3\%$$

$$\text{Earning power} = \frac{\text{PBIT}}{\text{Average total assets}} = \frac{170}{(785 + 715)/2} = 22.7\%$$

$$\text{Return on equity} = \frac{\text{Equity earnings}}{\text{Average equity}} = \frac{85}{(505 + 455)/2} = 17.7\%$$

b. Dupont equation

Return on equity = Net profit margin × Total assets turnover ratio × Leverage multiplier

$$\begin{aligned}
 &= \frac{\text{Net profit}}{\text{Net sales}} \times \frac{\text{Net sales}}{\text{Average total assets}} \times \frac{\text{Average total assets}}{\text{Average equity}} \\
 &= \frac{85}{1065} \times \frac{1065}{(785 + 715)/2} \times \frac{(785 + 715)/2}{(504 + 455)/2} \\
 &= 7.98\% \times 1.42 \times 1.5625 \\
 &= 17.7\%
 \end{aligned}$$

4.5 The balance sheets of ABC for the past two years are as under:

Liabilities	31-3-X6	31-3-X7	Assets	31-3-X6	31-3-X7
Equity shares	50000	50000	Gross fixed assets	60000	72000
General reserve	10000	14000	Less accumulated depreciation	16000	21000
Surplus	4000	4800	Net fixed assets	44000	51000
Public deposits	8000	2000	Long term investments	30000	32000
Debentures	15000	17000	Sundry debtors	16500	12000
Term loan	20000	18000	Inventories	32000	34000
Trade creditors	8000	10800	Miscellaneous expenses	9500	10000
Short term bank borrowing	15000	20000			
Provision for tax	2000	2400			
Total	132000	139000		132000	139000

- One of the important ratios considered by a bank for lending purposes is the ratio of the total outside liabilities to tangible net worth. What is this ratio for ABC for the year ended 31-3-X7?
- List out the sources and uses of funds for the year ended 31-3-X7 classifying them under the heads long-term and short-term.
- Comment on the uses of funds based on the above.

Solution

- Total outside liability = Public deposits + Debentures + Term loan + Trade creditors + Short term bank borrowing + Provision for tax.
 $= 2000 + 17000 + 18000 + 10800 + 20000 + 2400 = 70200$
Tangible networth = Equity shares + General reserve + Surplus – Miscellaneous expenses
 $= 50000 + 14000 + 4800 - 10000 = 58800$
The required ratio is: $70200 / 58800 = 1.19$
- Long-term sources** **Long-term uses**

Net profit	4800	Purchase of fixed assets	12000
(increase in reserve & surplus)		Additional investments	2000
Depreciation for the year	5000	Repayment of public deposits	6000
Increase in debentures	2000	Repayment of term loan	2000
		Addition to miscellaneous Expenses	500
Total of long-term sources	11800	Total of long-term uses	22500

Short-term sources **Short-term uses**

Increase in trade creditors	2800	Increase in inventories	2000
Increase in bank borrowing	5000		
Increase in provision for tax	400		
Decrease in sundry debtors	4500		
Total of short-term sources	12700	Total of short-term uses	2000
- Long-term deficit = $22500 - 11800 = 10700$
- Short-term surplus = $12700 - 2000 = 10700$

ABC has diverted short-term funds amounting to 10700 raised mainly by resorting to additional market credit and increased short-term bank borrowing, for long term uses like purchase of fixed assets and repayment of public deposits which is not prudent.

PROBLEMS

- Premier Company's net profit margin is 5 percent, total assets turnover ratio is 1.5 times, debt to total assets ratio is 0.7. What is the return on equity for Premier?
- 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?

- 4.3 The following data applies to a firm :

Interest charges	Rs. 150,000
Sales	Rs. 7,000,000
Tax rate	60 percent
Net profit margin	6 percent

What is the firm's times interest covered ratio?

- 4.4 A firm's current assets and current liabilities are 1,500 and 600 respectively. How much can it borrow from bank without reducing the current ratio below 1.5?

- 4.5 A firm has total annual sales (all credit) of 1,000,000 and accounts receivable of 160,000. How rapidly (in how many days) must accounts receivable be collected if management wants to reduce the accounts receivable to 120,000?

- 4.6 Determine the sales 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

- 4.7 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 Accounts receivable	= 40 days
Gross profit margin	= 20 percent
Inventory turnover ratio	= 5

Balance sheet

Equity capital	50,000	Plant and equipment	_____
Retained earnings	60,000	Inventories	_____
Debt	_____	Accounts receivable	_____
	_____	Cash	_____
	_____		_____

Sales

Cost of goods sold _____

- 4.8 The 20X0 balance sheet and Profit and loss account for Omex Limited are given below. Compute the financial ratios for Omex. Evaluate Omex's performance with reference to the standards.

Omx Limited Balance Sheet, December 31, 20X0

Liabilities and Equity

Equity capital	Rs. 10,000,000
Reserves and surplus	22,500,000
Long-term debt	12,500,000
Short-term bank borrowing	15,000,000

Trade creditors	10,000,000
Provisions	5,000,000
	Total
	75,000,000
Assets	
Fixed assets (net)	Rs. 30,000,000
Current assets	
Cash and bank	5,000,000
Receivables	15,000,000
Inventories	20,000,000
Pre-paid expenses	2,500,000
Other current assets	2,500,000
	Total
	75,000,000

Omx Limited Profit and Loss Account for the Year Ended December 31, 20X0

Net sales	Rs. 95,000,000
Cost of goods sold	72,000,000
Gross profit	23,000,000
Operating expenses	10,500,000
Operating profit	12,500,000
Non-operating surplus	2,600,000
Profit before interest and tax	15,100,000
Interest	5,000,000
Profit before tax	10,100,000
Tax	5,000,000
Profit after tax	5,100,000
Dividends	1,800,000
Retained earnings	3,300,000

<i>Omx</i>	<i>Standard</i>
Current ratio	1.5
Acid-test ratio	0.80
Debt-equity ratio	1.5
Times interest covered ratio	3.5
Inventory turnover ratio	4.0
Average collection period	60 days
Total assets turnover ratio	1.0
Net profit margin ratio	6%
Earning power	18%
Return on equity	15%

- 4.9 The comparative balance sheets and comparative Profit and Loss accounts for MM Limited, a machine tool manufacturer are given below.

	<i>Comparative Balance Sheets, MM Limited</i>				
	<i>(Rs. in million)</i>				
	<i>20X1</i>	<i>20X2</i>	<i>20X3</i>	<i>20X4</i>	<i>20X5</i>
<i>Liabilities and Equity</i>					
Share capital	2.4	2.4	3.0	3.0	3.2
Reserves and surplus	0.6	1.0	1.5	2.0	2.5
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
Current liabilities	1.3	1.8	2.1	2.4	2.4
	6.7	7.9	10.7	12.2	13.5

<i>Assets</i>	<i>20X1</i>	<i>20X2</i>	<i>20X3</i>	<i>20X4</i>	<i>20X5</i>
Net fixed assets	2.5	3.2	4.4	4.7	4.8
Current assets					
Cash and bank	0.5	0.6	0.7	0.8	0.7
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	0.2	0.3	0.3	0.4	0.6
	6.7	7.9	10.7	12.2	13.5

	<i>Comparative Profit and Loss Accounts, MM Limited</i>				
	<i>(Rs. in million)</i>				
	<i>20X1</i>	<i>20X2</i>	<i>20X3</i>	<i>20X4</i>	<i>20X5</i>
Net sales	4.0	6.1	7.8	9.1	11.2
Cost of goods sold	3.2	4.7	6.0	7.2	8.5
Gross profit	0.8	1.4	1.8	1.9	2.7
Operating expenses	0.4	0.5	0.7	0.8	1.0
Operating profit	0.4	0.9	0.9	1.1	1.7
Non-operating surplus deficit	0.1	0.2	0.1	0.2	0.3
Profit before interest and tax	0.5	1.1	1.0	1.3	2.0
Interest	0.2	0.3	0.4	0.5	0.6
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: Compute the important ratios for MM Limited for the years 20X1 – 20X5

- Current ratio
- Debt-equity ratio
- Total assets turnover ratio
- Net profit margin
- Earning power
- Return on equity

MINI CASE

The balance sheet and profit and loss account of GNL Limited for the year 20X5 are given below.

<i>Balance Sheet, GNL Limited</i> (Rs. in million)		
	20X4	20X5
<i>Liabilities and Equity</i>		
Share capital	6.5	6.5
Reserves and surplus	7.4	9.3
Long-term debt	5.2	8.8
Short-term bank borrowing	8.3	6.7
Current liabilities	6.6	6.7
	34.0	38.0
<i>Assets</i>		
Net fixed assets	19.6	23.2
Current assets		
Cash and bank	0.6	1.1
Receivables	2.9	2.0
Inventories	8.2	9.3
Other assets	2.7	2.4
	34.0	38.0
<i>Profit and Loss Account, GNL Limited</i> (Rs. in million)		
	20X4	20X5
Net sales	39.0	57.4
Cost of goods sold	30.5	45.8
Gross profit	8.5	11.6
Operating expenses	4.9	7.0
Operating profit	3.6	4.6
Non-operating surplus/deficit	0.5	0.4
Profit before interest and tax	4.1	5.0
Interest	1.5	2.0
Profit before tax	2.6	3.0
Tax	—	—
Profit after tax	2.6	3.0
Dividends	0.9	1.1
Retained earnings	1.7	1.9

Required

- Compute the key ratios for GNL Limited for the year 20X5.
- Prepare the Du Pont Chart for the year 20X5.
- Prepare the common size and common base financial statements for GNL.
- Identify the financial strengths and weaknesses of GNL Limited.
- What are the problems in analysing financial statements?
- Discuss the qualitative factors relevant for evaluating the performance and prospects of a company.



Financial Planning and Forecasting

Chapters 3 and 4 discussed what financial statements are and how they are analysed to assess a firm's past performance. While historical evaluation is important, anticipating what is likely to happen in the future is even more important. So you should know how to develop a financial plan.

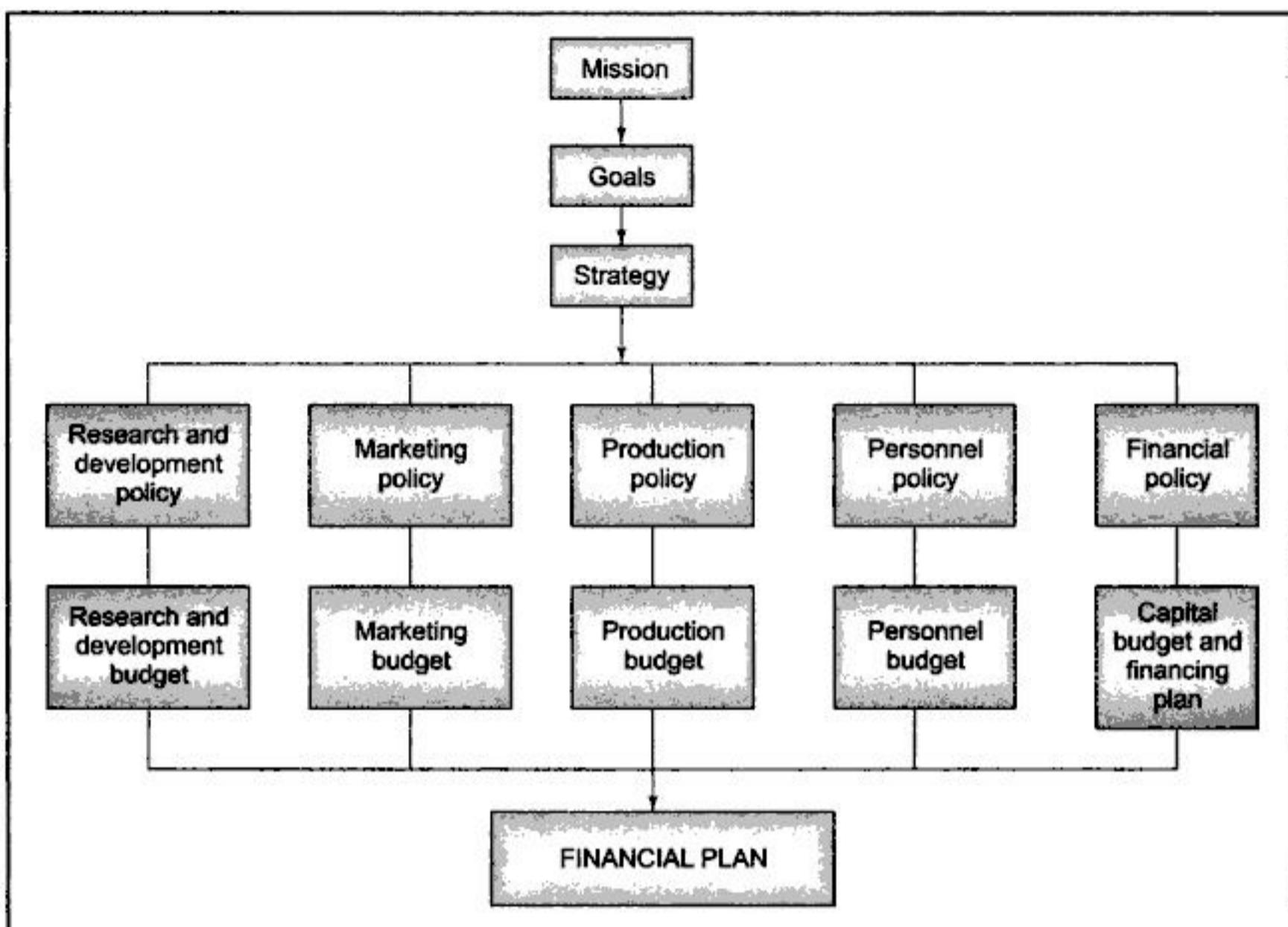
The financial manager prepares pro forma, or projected, financial statements to (a) assess whether the firm's forecasted performance squares with its own targets and with the expectation of investors, (b) examine the effect of proposed operating changes, (c) anticipate the financing needs of the firm, and (d) estimate the future free cash flows that determine the firm's value.

This chapter discusses various facets of financial planning and forecasting. It is divided into eight sections:

- The planning system
- What and why of financial planning
- Sales forecast
- *Pro forma* profit and loss account
- *Pro forma* balance sheet
- Financial modeling using spreadsheets
- Growth and external financing requirement
- Key growth rates

5.1 ■ THE PLANNING SYSTEM

Financial planning is part of a larger planning system in the firm. The planning process begins with a statement of the firm's mission, which is usually stated in qualitative terms. For example, the mission statement of Ranbaxy Laboratories is: "To be a research-oriented international pharmaceutical company." Given its mission, management sets goals which are defined in quantitative terms. Goals in turn inform strategy which is a plan to gain competitive edge over rival firms. To support the strategy, policies and budgets are developed in various areas such as research and development, production, marketing, personnel, and finance. These then get translated into the financial plan. Exhibit 5.1 shows schematically the planning system of the firm.

Exhibit 5.1 The Planning System

5.2 ■ 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. These are:

- Economic assumptions** The financial plan is based on certain assumptions about the economic environment (interest rate, tax 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.
- Pro forma statements** The heart of a financial plan are the *pro forma* (forecast) profit and loss account and balance sheet.
- 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.

5. 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.

Thus, the capital budgeting decision, working capital decision, capital structure decision, and dividend decision have to be established for developing an explicit financial plan. These decisions will be examined in detail in the chapters ahead. For our present discussion, however, they are assumed to be given.

Companies spend considerable time and resources in financial planning. 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.

5.3 ■ 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 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 own 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 to hammer out the sales forecast.

5.4 ≡ PRO FORMA PROFIT AND LOSS ACCOUNT

These are two commonly used methods for preparing the *pro forma* profit and loss account — the percent of sales method and the budgeted expense method.

Percent of Sales Method The percent of sales method for preparing the *pro forma* profit and loss account 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 5.2 illustrates the application of the percent of sales method of preparing the *pro forma* profit and loss account of Spaceage Electronics for the year 20X3. In this table, historical data are given for two previous years, 20X1 and 20X2. For projection purposes, a ratio based on the average of two previous years has been used. The forecast value of each item is obtained as the product of the estimated sales and the average percent of sales ratio applicable to that item. For example, the average percent of sales ratio for cost of goods sold is 65.0 percent. Multiplying the estimated sales of 1400 by 65.0 percent, the projected value of cost of goods sold 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 5.2 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 percent of sales method, though simple, is too rigid and mechanistic. For deriving the *pro forma* profit and loss account shown in Exhibit 5.2, 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* profit and loss account is being prepared. Obviously, this method requires greater effort on the part of management because it calls for defining likely developments.

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 percent 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 percent of sales method nor unduly onerous as the budgeted expense method.

Exhibit 5.2**Pro Forma Profit and Loss Account of Spaceage Electronics for 20X3 Based on Percent of Sales Method**

	Historical data			Pro forma profit and loss account of 20X3 assuming sales of 1400
	20X1	20X2	Average percent of sales	
Net sales	1200	1280	100.0	1400.0
Cost of goods sold	775	837	65.0	910.0
Gross profit	425	443	35.0	490.0
Selling expenses	25	27	2.1	29.4
General and administration expenses	53	54	4.3	60.2
Depreciation	75	80	6.3	88.2
Operating profit	272	282	22.3	312.2
Non-operating surplus/deficit	30	32	2.5	35.0
Profit before interest and tax	302	314	24.8	347.2
Interest on bank borrowings	60	65	5.0	70.0
Interest on debentures	58	60	4.8	67.2
Profit before tax	184	89	15.0	210.0
Tax	82	90	6.9	96.6
Profit after tax	102	99	8.1	113.4
Dividends	60	63		
Retained earnings	42	36		

Exhibit 5.3 presents the 20X3 *pro forma* profit and loss account for Spaceage Electronics, constructed by using a combination of the percent of sales and the budgeted expense methods. Cost of goods sold, selling expenses, and interest on bank borrowings 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.

5.5 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 percent of sales method to project the items on the assets side, except 'investments' and 'miscellaneous expenditure and losses'.
2. Estimate the expected values for 'investments' and 'miscellaneous expenditure and losses', using specific information applicable to them.
3. Use the percent of sales method to derive the projected values of current liabilities and provisions (referred to as spontaneous liabilities).

Exhibit 5.3 Pro Forma Profit and Loss Account of Spaceage Electronics for 20X3 Using the Combination Method

	<i>Historical data</i>			<i>Pro forma profit and loss account of for 20X3</i>
	20X1	20X2	Average percent of sales	
Net sales	1200	1280	100.0	1400.0
Cost of goods sold	775	837	65.0	910.0
Gross profit	425	443	35.0	490.0
Selling expenses	25	27	2.1	29.4
General and administration	53	54	Budgeted	56.0
Depreciation	75	80	Budgeted	85.0
Operating profit	272	282	@	319.6
Non-operating surplus/ deficit	30	32	2.5	35.0
Profit before interest and tax	302	314	@	354.6
Interest on bank borrowings	60	65	5.0	70.0
Interest on debentures	58	60	Budgeted	65.0
Profit before tax	184	189	@	219.0
Tax	82	90	Budgeted	90.0
Profit after tax	102	99	@	129.6
Dividends	60	63	Budgeted	70.0
Retained earnings	42	36	@	59.6

@ These items are obtained using accounting identities.

- Obtain the projected value of reserves and surplus by adding the projected retained earnings (from the *pro forma* profit and loss statement) to the reserves and surplus figure of the previous period.
- Set the projected values for equity and preference capital to be tentatively equal to their previous values.
- Assume that the projected values for loan funds will be tentatively equal to their previous levels less repayments or retirements as per terms and conditions applicable to them.
- 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 the 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 the example of Spaceage Electronics. Exhibit 5.4 shows the balance sheets of Spaceage for 20X1 and 20X2.

Exhibit 5.4 Pro Forma Balance Sheet of Spaceage Electronics for December 31, 20X3

	<i>Historical data</i>			<i>Projection for Dec. 31, 20X3</i>
	<i>December 31, 20X1</i>	<i>December 31, 20X2</i>	<i>Average of per cent of sales or some other basis</i>	<i>based on a forecast sales of 1400</i>
Net sales	1200	1280	100.0	1400.0
Assets				
Fixed assets (net)	800	850	66.5	931.0
Investments	30	30	No change	30
Current assets, loans and advances				
■ Cash and bank	25	28	2.1	29.4
■ Receivables	200	212	16.6	232.4
■ Inventories	375	380	30.4	425.6
■ Pre-paid expenses	50	55	4.2	58.8
Miscellaneous expenditure and losses	20	20	No change	20
Total	1500	1575		1727.2
Liabilities				
Share capital				
■ Equity	250	250	No change	250.0
■ Preference	50	50	No change	50.0
Reserves and surplus	250	286	Proforma income statement	345.6
Secured loans				
■ Debentures	400	400	No change	400
■ Bank borrowings	300	305	24.4	341.6
Unsecured loans				
■ Bank borrowings	100	125	9.1	127.4
Current liabilities and provisions				
■ Trade creditors	100	112	8.5	119.0
■ Provisions	50	47	3.9	54.6
External funds requirement			Balancing figure	39.0
Total	1500	1575		1727.2

The *pro forma* balance sheet for 20X3 is derived as follows:

Item	Basis of Projection
■ Current assets	■ Percent of sales method wherein the proportions are based on the average for the previous two years.
■ Fixed assets	■ - do -
■ Investments	■ Assumption of no change
■ Miscellaneous expenditure and losses	■ - do -
■ Current liabilities and provisions	■ Percent of sales method wherein the proportions are based on the average for the previous two years.
■ Equity and preference capital	■ Previous values
■ Reserves and surplus	■ <i>Pro forma</i> and loss account
■ Loan funds	■ Previous values
■ External funds required	■ Balancing item

Circularity Problem A circularity problem arises when the *pro forma* financial statements are prepared because the profit and loss account and the balance sheet are interrelated. The *pro forma* balance sheet cannot be prepared unless the *pro forma* profit and loss account, 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 interest expense associated with the amount of external financing, an item required to prepare the *pro forma* profit and loss account.

5.6 FINANCIAL MODELING USING SPREADSHEETS

We have worked out the financial projections above with a set of simple arithmetic relationships between the various items, based on some key assumptions. How convenient it would be if we can create a template for these statements where all the calculations are done automatically every time we change any of the input variables? Luckily, many spreadsheet packages like Microsoft Excel™ are available for this purpose. Excel has cells for inputting data. Each cell is uniquely specified by reference to the row and column on which it lies. The rows are numbered 1, 2, 3, 4,... from top to bottom and the columns have the headings A, B, C, D....from left to right . Thus A1 is the very first cell. The one immediately to its right is B1, the one immediately below it is A2 etc. We will use the data in Exhibits 5.3 and 5.4 to illustrate the application of spreadsheets in financial projections. Here, however, we will assume that the source of additional funds needed for the ensuing year, over and above the retained earnings, is increase in debentures.

First, input all the financial statement variables as text, one below the other, starting from Net sales in A2, as shown in Exhibit 5.5. In the adjacent columns B and C input the respective values against each of these variables for the years 20X1 and 20X2 and give the year references in B1 and B2. In D2 type 100. Select D3 and type out a formula $= (B3/\$B\$2+C3/\$C\$2)/2*100$. Note that whenever a formula is entered in a cell, it should start with = . The * within the formula stands for multiplication. This formula is nothing but the calculation of the average percent of cost of goods for the two years using the cell

references in place of the actual numbers, as Excel will use the value inside these cells to do the calculation. Press enter and you will get the value calculated viz. 65.0 inside the cell (The mysterious \$ sign will become clear later). When the worked out value is shown in D3, the corresponding formula $=(B3/\$B\$2+C3/\$C\$2)/2*100$ can be seen in the formula bar. Are we going to type such a long formula each time to calculate the average percent of sales for the other items? Not at all. What we will do is to copy the formula itself to the other cells where we want such values. Thus, select D3, click on the icon for copy and select D4 and paste it just as you do in a word document. Excel will copy the formula onto D4, changing the cell references relatively and will show the corresponding worked out value viz 35.0. While the worked out value is shown in D4 the corresponding formula $=(B4/\$B\$2+C4/\$C\$2)/2*100$ can be seen in the formula bar. Note that in the copied formula, the cell references B3 and C3 have correctly changed to B4 and C4 respectively and the other cell references viz. B2 and C2 have remained unchanged. This is the handiwork of the \$ sign. If you put this sign before the row and column notation of a cell, that cell reference will not change during any copying act. This is called making a cell reference absolute (as against relative). To make a cell reference absolute, just press F4 immediately after typing the cell reference and the two \$ signs will appear automatically. Now, copy this formula onto all the other cells where you need it, viz. D5, D9, D11, D22, D23, D24 and D25. Already getting the hang of it? Wait, Excel has many more powerful goodies in store.

We will use column E to show the formula used or the assumption based on which we are going to get the proforma statement values in the adjacent cells in column F. Note that this is done only for your ready reference. Start filling in column F by first going to F2 and typing 1400.0. Cost of goods sold is 65 percent of sales. So the formula for it in terms of the cell references is $=D3/\$D\$2*\$F\2 . Type this formula in F3 and press enter and you will get the corresponding value viz. 909.8 in F3. The formula used is displayed in the formula bar and the same has been typed out in E3. The use of the \$ sign in this formula foretells you that we are going to make further use of this formula for subsequent copying. Here one more point that may be noted is that while typing out the formula as a text (for reference purposes) in E3, you must first put a comma before typing =. Otherwise, when you press enter, the text will vanish and the formula value will appear. Also note that when you press enter, the comma will disappear and the formula beginning with = will appear.

Now that you have mastered the art of copying, fill in the values of all proforma income statement items that are based only on a percentage of sales, by copying the formula used in F2. Values in F6, F7, F14 and F16 are budgeted values and as such their absolute numerical values as given should be typed in. Type the word Budgeted in the respective preceding cells viz. E6, E7, E14 and E16 for our later reference. When you come to F8, the operating profit, type out the corresponding accounting identity in terms of cell references viz. $=F4-F5-F6-F7$ and press enter and the numerical value will appear therein. In E8 type out the formula used. Be ready to face the circularity problem mentioned earlier, when you come to filling in the proforma interest value, as there is circularity between interest in the income statement and debentures (which is dependent on interest) in the balance sheet. Luckily, Excel has a built-in arrangement to tackle this. To start with, as a first

guess, calculate the interest on the existing debenture. In our example it is 15 percent on 400 and therefore the formula is = 0.15*C34. Continue filling in all the remaining cells except F34, the cell for the proforma debenture and F41, the cell for total liabilities. As the total of assets should be equal to the total of liabilities, we know that F41 = F27. So copy the value in F 27 to F41 and fill in F 34 as the balancing figure by using the formula = F41-F30-F31-F32-F35-F37-F39-F40. Now, go to the menu Tools Options Calculation and click in the iteration check box. Then make a second pass by changing the formula for interest from = 0.15*C34 to = 0.15*F34 and press enter. Excel will automatically do the iterations required instantaneously and the values of interest on debentures, profit before tax, profit after tax, retained earnings and debentures figures will automatically change such that everything is once again exactly balanced. In Exhibit 5.5 a separate column F is shown which gives the final values after iteration (all other columns remaining unchanged).

The beauty of this template is that you can easily make a sensitivity analysis by changing the input values of any of the variables, say sales, and both the proforma statements automatically get suitably changed.

Exhibit 5.5 Financial Modeling Using Spreadsheet

	A	B	C	D	Before iteration		After iteration
					E	F	
1		20X1	20X2	Average percent sales		Pro forma profit and loss account for 20x3	
2	Netsales	1200	1280	100	Projected	1400.0	1400.0
3	Cost of goods sold	775	837	65.0	= D3/\$D\$2*\$F\$2	909.8	909.8
4	Gross profit	425	443	35.0	= D4/\$D\$2*\$F\$2	490.2	490.2
5	Selling expenses	25	27	2.1	= D5/\$D\$2*\$F\$2	29.3	29.3
6	General and administration	53	54		Budgeted	56.0	56.0
7	Depreciation	75	80		Budgeted	85.0	85.0
8	Operating profit				= F4-F5-F6-F7	319.9	319.9
9	Non-operating surplus/deficit	30	32	2.5	= D9/\$D\$2*\$F\$2	35.0	35.0
10	Profit before interest and tax				= F8 + F9	354.9	354.9
11	Interest on bank borrowings	60	65	5.0	= D11/\$D\$2*\$F\$2	70.5	70.5

(Contd.)

	A	B	C	D	E	F	F
12	Interest on debentures	58	60		= 0.15*C34	60.0	66.4
13	Profit before tax				= F10 – F11 – F12	224.4	218.0
14	Tax	82	90		Budgeted	90.0	90.0
15	Profit after tax				= F13 – F14	134.4	128.0
16	Dividends	60	63		Budgeted	70.0	70.0
17	Retained earnings				= F15 – F16	64.4	58.0
18	Balance Sheet					Proforma balance sheet for 20X3	Proforma balance sheet for 20X3
19	Fixed assets(net)	800	850	66.5	= D19/\$D\$2*\$F\$2	931.5	931.5
20	Investments	30	30		= C20	30	30.0
21	Current assets, loans and advances						
22	Cash and bank	25	28	2.1	= D22/\$D\$2*\$F\$2	29.9	29.9
23	Receivables	200	212	16.6	= D23/\$D\$2*\$F\$2	232.6	232.6
24	Inventories	375	380	30.5	= D24/\$D\$2*\$F\$2	426.6	426.6
25	Pre-paid expenses	50	55	4.2	= D25/\$D\$2*\$F\$2	59.2	59.2
26	Miscellaneous expenditure and losses	20	20		= C26	20	20
27	Total	1500	1575		= F19 + F20 + F22 + F23 + F24 + F25 + F26	1729.8	1729.8
28	Liabilities						
29	Share capital						
30	Equity	250	250		= C30	250.0	250.0
31	Preference	50	50		= C31	50	50.0
32	Reserves and surplus	250	286		= C32 + F17	350.4	344.0
33	Secured loans						
34	Debentures	400	400		= F41 – F30 – F31 – F32 – F35 – F37 – F39 – F40	436.4	442.8

(Contd.)

	A	B	C	D	E	F	
35	Bank borrowings	300	305	24.4	= D35/\$D\$2*\$F\$2	341.8	
36	Unsecured loans						
37	Bank borrowings	100	125	9.0	= D37/\$D\$2*\$F\$2	126.7	
38	Current liabilities and provisions						
39	Trade creditors	100	112	8.5	= D39/\$D\$2*\$F\$2	119.6	
40	Provisions	50	47	3.9	= D40/\$D\$2*\$F\$2	54.9	
41	Total	1500	1575		= F27	1729.8	
							F
							341.8
							126.7
							119.6
							54.9
							1729.8

5.7 GROWTH AND EXTERNAL FINANCING REQUIREMENT

When ratios remain constant, financing requirement may be estimated as follows:

$$EFR = \frac{A}{S} (\Delta S) - \frac{L}{S} (\Delta S) - mS_1 (1 - d) - (\Delta IM + SR) \quad (5.1)$$

where EFR is external funds requirement, A/S is the assets-to-sales ratio, ΔS is the expected increase in sales, L/S is the ratio of current liabilities and provisions (spontaneous liabilities) to sales, m is the net profit margin, S_1 is the projected sales for next year, d is the dividend payout ratio, ΔIM is the expected change in the level of 'investments' and 'miscellaneous expenditure and losses' put together, and SR is the scheduled repayment of term loans and debentures.

If we assume that the last term on the right hand side of Eq. (5.1) viz., $(\Delta IM + SR)$, is zero, the external funds requirement is

$$EFR = A/S (\Delta S) - L/S (\Delta S) - mS_1 (1 - d) \quad (5.2)$$

Manipulating Eq. (5.2) a bit, we get

$$\frac{EFR}{\Delta S} = \frac{A}{S} - \frac{L}{S} - \frac{m(1+g)(1-d)}{g} \quad (5.3)^2$$

² Dividing both the sides of Eq. (5.2) by ΔS we get:

$$\frac{EFR}{\Delta S} = \frac{A}{S} - \frac{L}{S} - \frac{mS_1(1-d)}{\Delta S} \quad (1)$$

Since S_1 is equal to $S_0 (1 + g)$ – here g is the growth rate in sales – and ΔS is $S_0 g$, the above simplifies to:

$$\frac{EFR}{\Delta S} = \frac{A}{S} - \frac{L}{S} - \frac{m(1-g)(1-d)}{g} \quad (2)$$

To illustrate the calculation, let us consider the following information available for Pioneer Limited: $A/S = 0.90$, $\Delta S = \text{Rs. } 6 \text{ million}$, $L/S = 0.40$, $m = 0.05$, $S_1 = \text{Rs. } 46 \text{ million}$, and $d = 0.6$. What is Pioneer's external funds requirement for the forthcoming year? The external funds requirement of Pioneer is:

$$\begin{aligned} EFR &= (0.90)(6) - (0.4)(6) - (0.05)(46)(0.4) \\ &= \text{Rs. } 2.08 \text{ million} \end{aligned}$$

From Eq (6.3) it is clear that, given A/S , L/S , m , and d , the external funds requirement as a ratio of increase in sales, i.e., $EFR/\Delta S$ is a function of g , the growth rate. For Pioneer, the relationship between $EFR/\Delta S$ and g is as follows:

$$\begin{aligned} \frac{EFR}{\Delta S} &= 0.50 - \frac{0.05(1+g)(1-0.60)}{g} \\ &= 0.50 - \frac{0.20(1+g)}{g} \end{aligned}$$

The value of $EFR/\Delta S$ for various values of g is shown below:

$g(\%)$	5	10	15	20	25
$EFR / \Delta S$	0.08	0.28	0.35	0.38	0.42

Forecasting when the Balance Sheet Ratios Change

In our discussion so far we assumed that the ratios of assets and liabilities to sales (A/S and L/S) remain constant over time. This implies that each 'spontaneous' asset and liability account changes at the same rate as sales. Graphically, it means that the relationship is linear and passes through the origin as shown in Exhibit 5.5(a).

The assumption of constant ratios and identical growth rates may be appropriate sometimes, but not always. In particular, its applicability is suspect in the following situations.

Economies of Scale In the use of many kinds of assets, economies of scale occur. This means that the ratios change over time as the size of the firm increases. For example, as sales expand inventories grow less rapidly than sales and hence the ratio of inventory to sales falls. Here we find that the inventory-to-sales ratio is 0.5 or 50 per cent, when sales are Rs. 200 million, but the ratio declines to 0.45 or 45 percent when sales rise to Rs. 400 million.

The relationship depicted in Exhibit 5.5(b) is linear, but not one that passes through the origin. Often, however, a curvilinear relationship of the kind shown in Exhibit 5.5 (c) obtains. In such a situation, larger increases in sales can be supported by smaller increases in inventories.

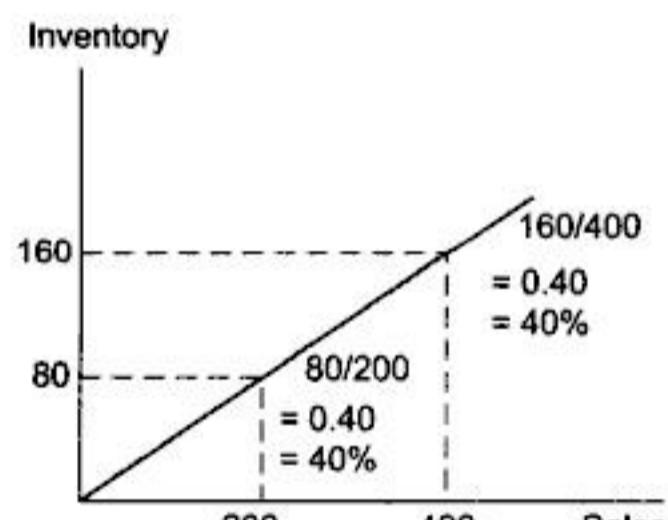
Lumpy Assets In many industries, fixed assets have to be added in large, discrete units due to technological reasons. Due to such lumpy increments of fixed assets, the relationship between fixed assets and sales is as shown in Exhibit 5.5(d).

Forecasting Errors and Excess Assets The relationships depicted in Exhibit 5.5 reflect target, or projected, relationships between sales and assets. Actual sales often differ from projected sales and hence the actual asset/sales ratio may differ from the planned ratio. To illustrate, suppose that a firm has a fixed assets to sales ratio of 1:2 and, in anticipation of an increase in sales from Rs. 200 million to Rs. 300 million, it increases its fixed assets from Rs. 100 million to Rs. 150 million. However, if the sales remain stagnant at Rs. 200 million, it will have an excess capacity which can support a sales increase of Rs. 100 million. In such a situation, if the firm were to prepare its forecast for the following year it should recognise that additional sales of Rs. 100 million will require no further investment in fixed assets.

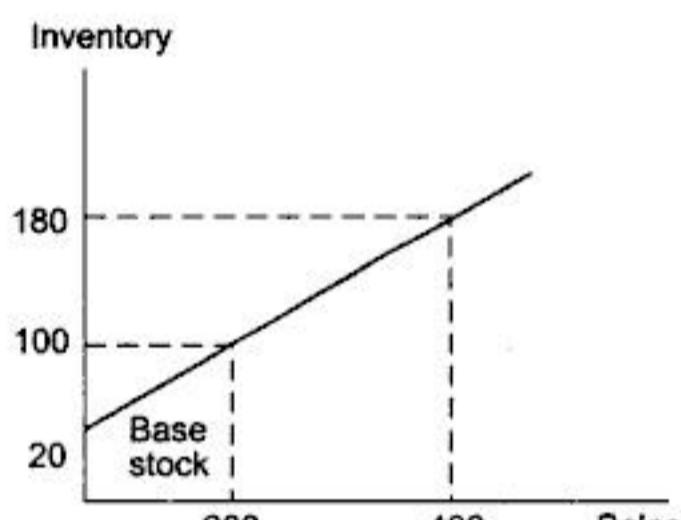
5.8 ■ KEY GROWTH RATES

Growth is often the central theme of corporate planning. Firms generally state corporate goals in terms of growth rates. Given our emphasis on maximising shareholder value as the principal goal of the firm, the preoccupation of planners with growth seems puzzling.

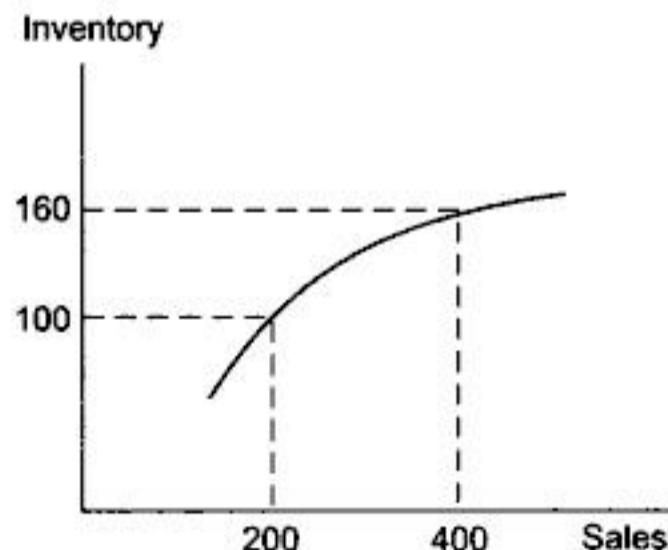
Exhibit 5.5 Various Possible Ratio Relationships (Rs. in million)



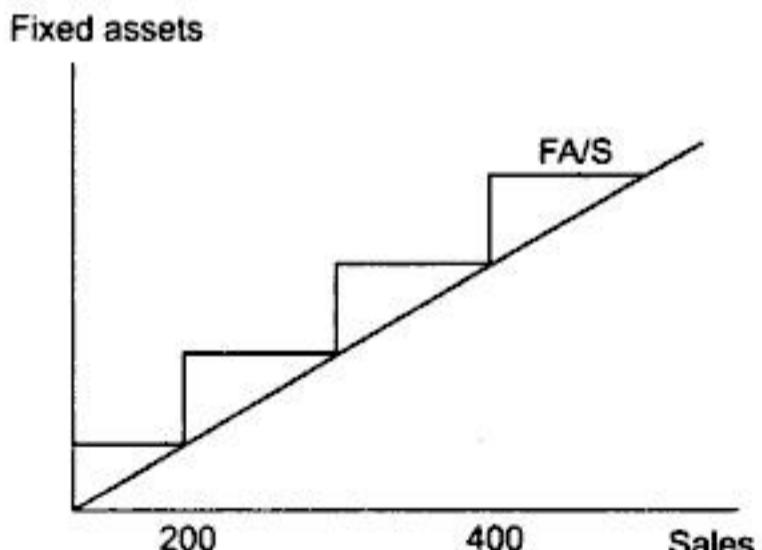
(a) Constant ratios



(b) Economies of scale: declining ratios



(c) Curvilinear relationship



(d) Lumpy assets

One way to explain this is to assume that growth is an intermediate goal which, in turn, contributes to value creation.

While firms are interested in growth, they may be reluctant to raise external equity. Given this reluctance, it is useful to calculate two growth rates in the context of long-term financial planning: the internal growth rate and the sustainable growth rate.

The Internal Growth Rate

The **internal growth rate** is the maximum growth rate that can be achieved with no external financing whatsoever. Put differently, this is the growth rate that can be sustained with retained earnings, which represent internal financing.

To determine the internal growth rate, we will make the following assumptions:

- The assets of the firm will increase proportionally to sales.
- The net profit margin (net profit to sales) is constant.
- The dividend payout ratio (and the ploughback ratio) is given.
- The firm will not raise external finance.

Given these assumptions, the internal growth rate is a *plug variable*. To derive the plug variable, remember that the change in assets must be equal to the retained earnings:

$$\text{Addition to assets} = \text{Addition to retained earnings}$$

We can now write the conditions that satisfy this equality and solve for the growth rate. To do this, we will employ the following variables.

m = net profit margin on sales

b = ploughback ratio

A_0 = current total assets of the firm

S_0 = sales for the current year

S_1 = sales for the next year

g = growth rate in sales as well as assets

Given the above assumptions and symbols, we get the following.

Net profit for the next period : $m S_1 = mS_0 (1+g)$

Addition to retained earnings : $m S_0 (1+g) b$

Addition to assets : $A_0 g$

Since the addition to assets equals the addition to retained earnings we have:

$$A_0 g = mS_0 (1 + g) b \quad (5.4)$$

Juggling this a bit, we get:

$$g = \frac{mS_0 b}{A_0 - mS_0 b} \quad (5.5)$$

Dividing both the numerator and the denominator of the right hand side of Eq. (5.5) by A_0 , we get:

$$g = \frac{m(S_0 / A_0)b}{A_0 / A_0 - m(S_0 / A_0)b} \quad (5.6)$$

In words,

$$\text{Internal growth rate} = \frac{\text{Net profit margin} \times \text{Asset turnover} \times \text{Ploughback ratio}}{1 - \text{Net profit margin} \times \text{Asset turnover} \times \text{Ploughback ratio}}$$

Recall from the previous chapter that:

$$\text{Return on assets} = \text{Net profit margin} \times \text{Asset turnover}$$

Thus,

$$\text{Internal growth rate} = \frac{\text{Return on assets} \times \text{Ploughback ratio}}{1 - \text{Return on assets} \times \text{Ploughback ratio}}$$

To illustrate, suppose the return on assets and ploughback ratio for Acme Chemicals are 12 percent and 60 percent respectively. What is the internal growth rate? The internal growth rate is:

$$\frac{0.12 \times 0.6}{1 - 0.12 \times 0.6} = 0.78 \text{ or } 7.8 \text{ percent}$$

The Sustainable Growth Rate

The **sustainable growth rate** is the maximum growth rate that a firm can achieve without resorting to external equity finance. This is the growth rate that can be sustained with the help of retained earnings matched with debt financing, in line with the debt-equity policy of the firm.

This is an important growth rate because firms are reluctant to raise external equity finance (even though they may not mind raising debt finance, in line with their debt-equity policy) for the following reasons: (i) The dilution of control, consequent to the external equity issue, may not be acceptable to the existing controlling interest. (ii) There may be a significant degree of underpricing when external equity is raised. (iii) The cost of issue tends to be high.

The sustainable growth rate is calculated the way in which the internal growth rate is calculated, except for one difference: To calculate the sustainable growth rate we have to consider retained earnings plus matching debt, in line with the firm's debt equity (D/E) ratio. Thus

$$\text{Addition to assets} = \text{Additional retained earnings} + \text{Additional debt}$$

$$A_0 g = mS_0(1 + g)b + mS_0 (1 + g)b (D/E) \quad (5.7)$$

Juggling this equation a bit, we get

$$g = \frac{m(S_0 / A_0)(1 + D/E)b}{1 - m(S_0 / A_0)(1 + D/E)b} \quad (5.8)^3$$

In words,

$$\begin{aligned} \text{Sustainable growth rate} &= \frac{\text{Net profit margin} \times \text{Asset turnover}}{1 - \text{Net profit margin} \times \text{Asset turnover}} \\ &\quad \times \frac{(1 + \text{Debt-equity ratio}) \times \text{Ploughback ratio}}{(1 + \text{Debt-equity ratio}) \times \text{Ploughback ratio}} \end{aligned}$$

Recall from the previous chapter that:

$$\text{Return on equity} = \text{Net profit margin} \times \text{Asset turnover} \times (1 + \text{Debt-equity ratio})$$

Thus,

$$\text{Sustainable growth rate} = \frac{\text{Return on equity} \times \text{Ploughback ratio}}{1 - \text{Return on equity} \times \text{Ploughback ratio}}$$

To illustrate, suppose the return on equity and ploughback ratio for Zenith electronics are 15 percent and 70 percent. What is the sustainable growth rate? The sustainable growth rate is:

$$\frac{0.15 \times 0.7}{1 - 0.15 \times 0.7} = 0.117 \text{ or } 11.7 \text{ percent}$$

Examining Eq. (5.8) we find that other things being equal:

- The higher the net profit margin, the higher the sustainable growth rate.
- The higher the asset turnover, the higher the sustainable growth rate.
- The higher the debt-equity ratio, the higher the sustainable growth rate.
- The higher the ploughback ratio, the higher the sustainable growth rate.

Thus, the sustainable growth rate can be increased, by effecting one or more of the following changes:

- Increase in the net profit margin
- Increase in the asset turnover ratio

³ The steps involved here are as follows:

$$A_0 g = mS_0(1 + g)b + mS_0(1 + g)b(D/E) \quad (1)$$

$$g = m(S_0/A_0)(1 + g)b + m(S_0/A_0)(1 + g)b(D/E) \quad (2)$$

$$g = m(S_0/A_0)b + m(S_0/A_0)gb + m(S_0/A_0)b(D/E) + m(S_0/A_0)gb(D/E) \quad (3)$$

$$g = m(S_0/A_0)b(1 + D/E) + m(S_0/A_0)gb(1 + D/E) \quad (4)$$

$$g - m(S_0/A_0)gb(1 + D/E) = (S_0/A_0)b(1 + D/E) \quad (5)$$

$$g[1 - m(S_0/A_0)b(1 + D/E)] = m(S_0/A_0)b(1 + D/E) \quad (6)$$

$$g = \frac{m(S_0/A_0)b(1 + D/E)}{1 - m(S_0/A_0)b(1 + D/E)} \quad (7)$$

- Increase in the debt-equity ratio
- Increase in the ploughback ratio

Though the above-mentioned changes enhance the sustainable growth rate, management may not have equal influence over them. Further, these changes do not always have a favourable overall impact on the firm. For example, it may be possible for the management to change the payout ratio and the financial leverage ratio more easily than to change the net profit margin or the asset turnover ratio. In effecting these changes their other implications have to be taken into account. For example, a decrease in the dividend payout ratio may have an unfavourable effect on the stock price and an increase in financial leverage may raise the total risk of the firm beyond acceptable limits.

SUMMARY

- The long-term financial plan represents a blueprint of what the firm proposes to do in 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* profit and loss account: **the percent of sales method** and **the budgeted expense method**.
- The percent of sales method assumes that the future relationship between various elements of cost 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 **external funds requirement** may be estimated as follows:

$$EFR = A/S (\Delta S) - L/S (\Delta S) - mS_1(1 - d) - (\Delta IM + SR)$$

- The **internal growth rate** is the growth rate that can be achieved with no external financing whatsoever.
- The **sustainable growth rate** is the growth rate that can be sustained with the help of retained earnings matched with debt financing, in line with the debt equity policy of the firm.

QUESTIONS

1. Show schematically the planning system of a firm.
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* profit and loss account: (i) the percent 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 because the profit and loss account and the balance sheet are interrelated.
8. Discuss the formula for estimating the external funds requirement.
9. State some of the reasons why firms may be disinclined to raise external equity capital.
10. Develop the formula expressing the growth rate (g) sustainable with internal equity terms of (i) the net profit margin ratio (m), (ii) the target dividend payout ratio (d), (iii) the assets-to-equity ratio (A/E), and (iv) the assets-to-sales ratio (A/S).

SOLVED PROBLEMS

5.1 The income statements and balance sheets of Deepam Silks for years 1 and 2 are as follows:

<i>Profit and Loss Account</i>	<i>Year 1</i>	<i>Year 2</i>
■ Net sales	600	720
■ Cost of goods sold	450	500
■ Gross profit	150	220
■ Selling expenses	50	60
■ General and administration expenses	36	40
■ Depreciation	30	40
■ Operating profit	34	80
■ Non-operating surplus/deficit	10	(8)
■ Profit before interest and tax	44	72
■ Interest	10	12
■ Profit before tax	34	60
■ Tax	14	26
■ Profit after tax	20	34
■ Dividends	12	15
■ Retained earnings	8	19

<i>Balance Sheet</i>	<i>Year 1</i>	<i>Year 2</i>
<i>Assets</i>		
■ Fixed assets (net)	240	270
■ Investments	10	10
■ Current assets, loans and advances		
■ Cash and bank	5	6
■ Receivables	80	90
■ Inventories	125	144
■ Loans and advances	25	30
■ Miscellaneous expenditures and losses	15	10
Total	500	560

<i>Balance Sheet</i>	<i>Year 1</i>	<i>Year 2</i>
<i>Liabilities</i>		
■ Share capital		
■ Equity	100	100
■ Preference	20	20
■ Reserves and surplus	150	169
■ Secured loans		
■ Bank borrowings	60	80
■ Unsecured loans		
■ Public deposits	-	11
■ Current liabilities and borrowings		
■ Trade creditors	125	130
■ Provisions	45	50
	500	560

Prepare the proforma income statement for year 3 and the proforma 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 profit and loss account items may be derived using the percent of sales method (for this purpose, assume that the average of the percentages for years 1 and 2 is applicable).
 - Cost of goods sold
 - Selling expenses
 - General and administration expenses
 - Non-operating surplus/deficit
 - Interest
- (c) The forecast values for the other items of the profit and loss account are as follows:
 - Depreciation : 45
 - Tax : 50 percent of earnings before tax
 - Dividends : 21
- (d) The forecast values of various balance sheet items may be derived as follows:

Fixed assets (net)	: Budgeted at 300
Investments	: No change over year 2
Current assets	: Percent of sales method wherein the percentages are based on the average for the previous two years
Miscellaneous expenditures	: Expected to be reduced to 5 and losses
Equity and preference capital	: No change over year 2
Reserves and surplus	: Proforma profit and loss account
Bank borrowings and current	: Percent of sales method wherein the percentages are liabilities and provisions based on the average for the previous two years
Public deposits	: No change
External fund required	: Balancing item

Solution

The proforma profit and loss account and the proforma balance sheet are shown below:

<i>Pro forma Profit and loss account for Deepam Silks for Year 3</i>				
	<i>Historical data</i>		<i>Average per cent of sales</i>	<i>Pro forma profit and loss account for year 3</i>
	<i>Year 1</i>	<i>Year 2</i>		
■ Net sales	600	720		850
■ Cost of goods sold	450	500	72.0	612
■ Gross profit	150	220	@	238
■ Selling expenses	50	60	8.3	70.6
■ General and administration expenses	36	40	5.8	49.3
■ Depreciation	30	40	Budgeted	45
■ Operating profit	34	80	@	73.1
■ Non-operating surplus/deficit	10	-8	1.4	11.9
■ Profit before interest and tax	44	72	@	85.0
■ Interest	10	12	1.7	14.5
■ Profit before tax	34	60	@	70.5
■ Tax	14	26	Budgeted	35.3
■ Profit after tax	20	34	@	35.2
■ Dividends	12	15	Budgeted	21
■ Retained earnings	8	19	@	14.2

@ Based on accounting identity.

<i>Pro forma Profit and Loss account for Deepam Silks for Year 3</i>				
	<i>Historical data</i>		<i>Average per cent of sales</i>	<i>Pro forma profit and loss account for year 3</i>
	<i>Year 1</i>	<i>Year 2</i>		
■ Net sales	600	720		850
<i>Assets</i>				
■ Fixed assets (net)	240	270	Budgeted	300
■ Investments	10	10	No change	10
■ Current assets, loans and advances				
■ Cash	5	6	0.8	6.8
■ Receivables	80	90	12.9	109.7
■ Inventories	125	144	20.0	170.0
■ Loans and advances	25	30	4.1	34.9
■ Miscellaneous expenditures and losses	15	10	Budgeted	5.0
Total	500	560		636.4

<i>Liabilities</i>				
■ Share capital				
■ Equity	100	100	No change	100
■ Preference	20	20	No change	20
■ Reserves and surplus	150	169	Proforma profit and loss account	183.2
■ Secured loans				
■ Bank borrowings	60	80	10.6	90.1
■ Unsecured loans				
■ Public deposits	-	11	No change	11.0
■ Current liabilities				
■ Trade creditors	125	130	19.4	164.9
■ Provisions	45	50	7.2	61.2
■ External funds requirement			Balancing item	6.0
	500	560		636.4

- 5.2 The following information is available for Olympus Limited : $A/S = 0.8$, $\Delta S = \text{Rs. } 20$ million, $L/S = 0.40$, $m = 0.06$, $S_1 = \text{Rs. } 100$ million, and $d = 0.4$. What is the external funds requirement for the forthcoming year?

Solution

The external funds requirement of Olympus is:

$$\begin{aligned} EFR &= A^*/S_0(\Delta S) - L^*/S(\Delta S) - mS_1(r) \\ &= 0.8 \times 20 - 0.4 \times 20 - .06 \times 100 \times 0.6 \\ &= \text{Rs. } 4.4 \text{ million} \end{aligned}$$

- 5.3 The following information is available for Signal Corporation: $m = 0.05$, $d = 0.30$, $A/E = 2.4$, $A/S_0 = 1.0$. What rate of growth can be sustained with internal equity?

Solution

The sustainable growth rate for Signal is:

$$\begin{aligned} g &= \frac{m(S_0/A_0)(1+D/E)b}{1-m(S_0/A_0)(1+D/E)b} = \frac{0.05 \times 1 \times 2.4 \times 0.7}{1 - 0.05 \times 1 \times 2.4 \times 0.7} \\ &= 9.17 \text{ percent} \end{aligned}$$

PROBLEMS

- 5.1 The profit and loss account of Modern Electronics Limited for years 1 and 2 is given below:

	Year 1	Year 2
Net sales	800	890
Cost of goods sold	610	680
Gross profit	190	210
Selling expenses	60	65

(Contd.)

General and administration expenses	60	52
Depreciation	50	64
Operating profit	20	29
Non-operating surplus deficit	8	10
Earnings before interest and tax	28	39
Interest	10	11
Earnings before tax	18	28
Tax	7	10
Earnings after tax	11	8
Dividends	6	7
Retained earnings	5	11

Using the percent of sales method, prepare the *pro forma* profit and loss account 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

- 5.2 Re-work problem 1 assuming the following budgeted amounts:

General and administration expenses	55
Depreciation	60
Interest	12
Dividends	8

- 5.3 The balance sheet of Modern Electronics Ltd. as of the end of years 1 and 2 is given below:

Assets	Year 1	Year 2
Fixed assets (net)	300	380
Investment	20	20
Current assets, loans and advances:		
■ Cash and bank	12	
■ Receivables	200	
■ Inventories	173	
■ Prepaid expenses	41	45
Miscellaneous expenditures and losses	15	14
	741	865
<i>Liabilities</i>		
Share capital		
■ Equity	150	150
Reserves and surplus	118	129
Secured loans		
■ Term loans	144	175
■ Bank borrowings	163	199
Current liabilities		
■ Trade creditors	126	167
■ Provisions	40	45
	741	865

As in problem 1, assume that sales will grow to 1020 in year 3. Assume that all items on the assets side, except investment and miscellaneous expenditures and losses, will grow proportionally to sales. Likewise, trade credit and provisions will be proportional to sales. Obtain the estimated value of retained earnings from the *pro forma* profit and loss account developed in problem 2. Finally estimate the amount of external financing needed for year 3.

- 5.4 The balance sheet of Deepak Cables Limited on December 31, 20X0 is shown below:

Share capital	150	Fixed assets	400
Retained Earnings	180	Inventories	200
Term Loans	80	Receivables	150
Short-term Bank Borrowings	200	Cash	50
Accounts Payable	140		
Provisions	50		
	<hr/>		<hr/>
	800		800

The sales of the firm for the year ending on December 31, 20X0 were 1,000. Its profit margin on sales was 6 percent and its dividend payout ratio was 50 percent. The tax rate was 60 percent. Deepak Cables expects its sales to increase by 30 percent in the year 20X1. The ratio of assets to sales and spontaneous current liabilities to sales would remain unchanged. Likewise the profit margin ratio, the tax rate, and the dividend payout ratio would remain unchanged.

Required: 1. Estimate the external funds requirement for the year 20X1.

2. Prepare the following statements, assuming that the external funds requirement would be raised equally from term loans and short-term bank borrowings: (i) projected balance sheet and (ii) projected profit and loss account.

- 5.5 The balance sheet of Elgin Corporation as on 31st December 20X0 is shown below:

Share capital	30	Net fixed assets	60
Retained earnings	40	Inventories	50
Term loans	20	Debtors	30
Short-term bank borrowings	30	Cash	10
Trade creditors	25		
Provisions	5		
	<hr/>		<hr/>
	150		• 150

Sales for 20X0 were 160, while net profit after taxes was 10. Elgin paid dividend of 5 to equity shareholders.

- (a) If sales increase by 50 percent (80) during 20X1, what will be Elgin's external funds requirement? Assume that profit margin ratio and dividend payout ratio would remain unchanged.
- (b) Prepare Elgin's projected balance sheet as on 31st December 20X1. Assume that the external fund requirement will be raised equally from term loans and fresh issue on equity capital.

- (c) Calculate the following ratios for 20X0 and 20X1: current ratio, debt to total assets ratio, and return on equity.
- (d) Assume, now, that the sales growth of 80 occurs evenly over a period of 4 years (20 per year) rather than in just one year. (i) Calculate the total external fund requirement over the four-year period, (ii) Construct a *pro forma* balance sheet as on December 31, 20X4.
- 5.6 The following information is given for MCI Company:
- | | |
|--|--------------|
| Assets to sales ratio | = 0.80 |
| Spontaneous liabilities to sales ratio | = 0.50 |
| Profit margin | = 5 per cent |
| Dividend payout ratio | = 0.6 |
| Previous year's sales | = 1200 |
- What is the maximum sales growth rate that can be financed without raising external funds?
- 5.7 The balance sheet of Pradhan Company at the end of year 20X0, which is just over, is given below:
- | | | | |
|-----------------------|-----------|--------------|-----------|
| Share capital | 50 | Fixed assets | 130 |
| Retained earnings | 60 | Inventories | 90 |
| Long-term borrowings | 80 | Receivables | 80 |
| Short-term borrowings | 60 | Cash | 20 |
| Trade creditors | 50 | | |
| Provisions | 20 | | |
| | <hr/> 320 | | <hr/> 320 |
- The sales for the year just ended were 400. The expected sales for the year 20X1 are 500. The profit margin is 5 percent and the dividend payout ratio is 50 percent.
- Required:*
- Determine the external funds requirement for Pradhan for the year 20X1.
 - How should the company raise its external funds requirement, if the following restrictions apply? (i) Current ratio should not be less than 1.25. (ii) The ratio of fixed assets to long-term loans should be greater than 1.25. Assume that the company wants to tap external funds in the following order: short-term bank borrowing, long-term loans, and additional equity issue.
- 5.8 The following information is available about Videosonics Limited:
- | | |
|--|--------------|
| Sales of this year | = 10,000 |
| Projected sales increase for next year | = 10 percent |
| Profit after tax this year | = 600 |
| Dividend payout ratio | = 60 percent |
| Projected surplus funds available next year | = 150 |
| Present level of spontaneous current liabilities | = 3,000 |
- What is the level of total assets for Videosonics now?

5.9 Chronomics Limited has the following financial ratios:

m = net profit margin ratio = 5 percent

d = target dividend payout ratio = 60 percent

A/E = assets-to-equity ratio = 2.5

A/S = assets-to-sales ratio = 1.4

- (a) What is the rate of growth that can be sustained with internal equity?
- (b) If Chronomatic Limited wants to achieve a 5 percent growth rate with internal equity, what change must be made in the dividend payout ratio, other ratios remaining unchanged?
- (c) If Chronomatic Limited wants to achieve a 5 percent growth rate with internal equity, what change must be made in the assets-to-equity ratio, other ratios remaining unchanged?
- (d) If Chronomatic Limited wants to achieve a 6 percent growth rate with internal equity, what should be the improvement in the profit margin, other ratios remaining unchanged?
- (e) If Chronomatic Limited wants to achieve a 6 percent growth rate with internal equity, what change must occur in the assets-to-sales ratio, other ratios remaining unchanged?

5.10 The following information is given for Abacus Limited.

Assets to sales ratio = 0.90

Net profit margin = 6 percent

Plough back ratio = 80 percent

What is the internal growth rate?



FUNDAMENTAL VALUATION CONCEPTS

- 6 The Time Value of Money**
- 7 Valuation of Bonds and Stocks**
- 8 Risk and Return**
- 9 Risk and Return: Portfolio Theory and Asset Pricing Models**
- 10 Options and their Valuation**

III

The Time Value of Money

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.

Most financial problems involve cash flows occurring at different points of time. These cash flows have to be brought to the same point of time for purposes of comparison and aggregation. Hence you should understand the tools of compounding and discounting which underlie most of what we do in finance—from valuing securities to analysing projects, from determining lease rentals to choosing the right financing instruments, from setting up the loan amortisation schedules to valuing companies, so on and so forth.

This chapter discusses the methods for dealing with the time value of money. It is organised into six sections as follows:

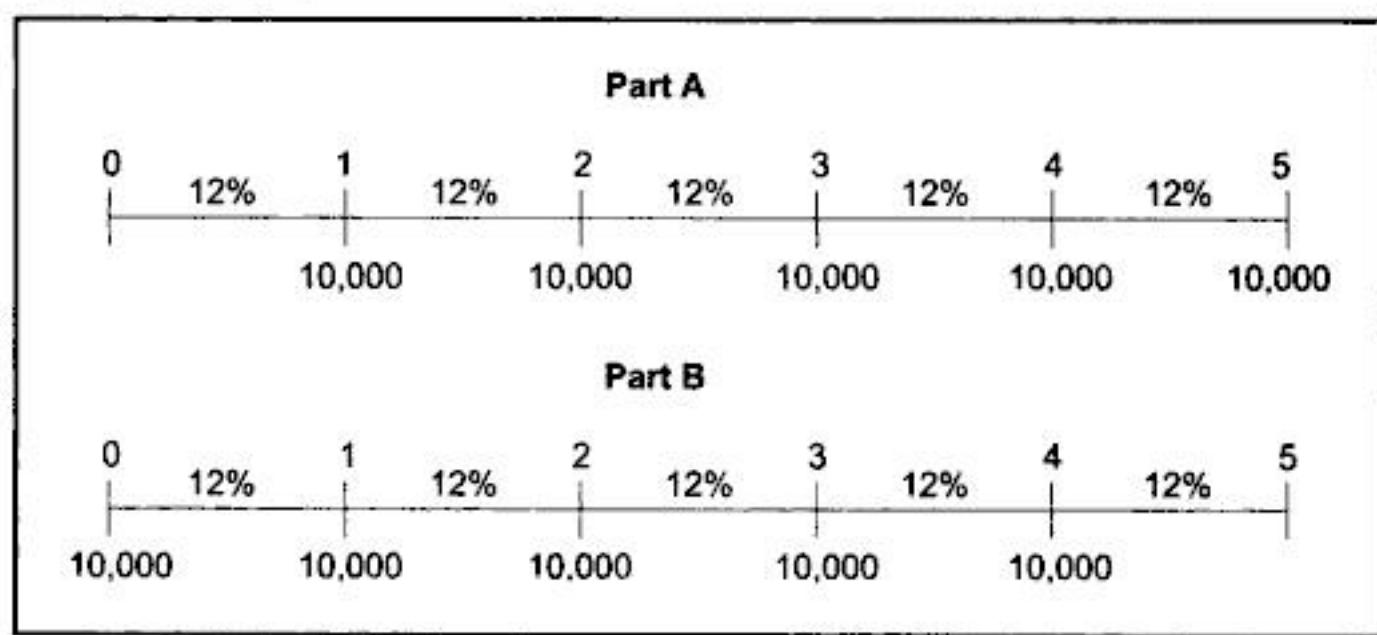
- Time lines and notation
- Future value of a single amount
- Present value of a single amount
- Future value of an annuity
- Present value of an annuity
- Intra-year compounding and discounting

6.1 ■ TIME LINES AND NOTATION

When cash flows occur at different points in time, it is easier to deal with them using a *time line*. A time line shows the timing and the amount of each cash flow in a cash flow stream. Thus, a cash flow stream of Rs. 10,000 at the end of each of the next five years can be depicted on a time line like the one shown in Part A of Exhibit 6.1.

In Exhibit 6.1, 0 refers to the present time. A cash flow that occurs at time 0 is already in present value terms and hence does not require any adjustment for time value of money. You must distinguish between a *period of time* and a *point in time*. Period 1 which is the first year is the portion of time line between point 0 and point 1. The cash flow occurring at point 1 is the cash flow that occurs at the end of period 1. Finally, the discount rate, which is 12 percent in our example, is specified for each period on the time line and it may differ from period to period. If the cash flow occurs at the beginning, rather than the end, of each year, the time line would be as shown in Part B of Exhibit 6.1.

Exhibit 6.1 Time Line



Note that a cash flow occurring at the end of year 1 is equivalent to a cash flow occurring at the beginning of year 2.

Cash flows can be positive or negative. A positive cash flow is called a *cash inflow*; a negative cash flow, a *cash outflow*.

The following notation will be used in our discussion:

- PV : Present value
- FV_n : Future value n years hence
- C_t : Cash flow occurring at the end of year t
- A : A stream of constant periodic cash flow over a given time
- r : Interest rate or discount rate
- g : Expected growth rate in cash flows
- n : Number of periods over which the cash flows occur.

6.2 ■ FUTURE VALUE OF A SINGLE AMOUNT

Suppose you invest Rs. 1,000 for three years in a savings account that pays 10 percent interest per year. If you let your interest income be reinvested, your investment will grow as follows:

First year	: Principal at the beginning	1,000
	Interest for the year	100
	(Rs. 1,000 × 0.10)	
	Principal at the end	1,100

Second year	:	Principal at the beginning	1,100
		Interest for the year	110
		(Rs. 1,100 × 0.10)	
		Principal at the end	1,210
Third year	:	Principal at the beginning	1,210
		Interest for the year	121
		(Rs. 1,210 × 0.10)	
		Principal at the end	1,331

Formula

The process of investing money as well as reinvesting the interest earned thereon is called compounding. The future value or compounded value of an investment after n years when the interest rate is r percent is :

$$FV_n = PV(1 + r)^n \quad (6.1)$$

In this equation $(1 + r)^n$ is called the future value interest factor or simply the future value factor.

To solve future value problems you have to find the future value factors. You can do it in different ways. In the example given above, you can multiply 1.10 by itself three times or more generally $(1 + r)$ by itself n times. This becomes tedious when the period of investment is long.

Fortunately, you have an easy way to get the future value factor. Most calculators have a key labelled " y^x ". So all that you have to do is to enter 1.10, press the key labelled y^x , enter 3, and press the "=" key to obtain the answer.

Alternatively, you can consult a future value interest factor (FVIF) table. Exhibit 6.2 presents one such table showing the future value factors for certain combinations of periods and interest rates. A more comprehensive table is given in Appendix A at the end of the book.

Suppose you deposit Rs. 1,000 today in a bank which pays 10 percent interest compounded annually, how much will the deposit grow to after 8 years and 12 years ?

$$\begin{aligned} \text{Rs. } 1,000 (1.10)^8 &= \text{Rs. } 1,000 (2.144) \\ &= \text{Rs. } 2,144 \end{aligned}$$

The future value, 12 years hence, will be :

$$\begin{aligned} \text{Rs. } 1,000 (1.10)^{12} &= \text{Rs. } 1,000 (3.138) \\ &= \text{Rs. } 3,138 \end{aligned}$$

Exhibit 6.2 Value of FVIF_{r,n} for Various Combinations of r and n

n/r	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

While tables are easy to use they have a limitation as they contain values only for a small number of interest rates. So often you may have to use a calculator.

Compound and Simple Interest

So far we assumed that money is invested at compound interest which means that each interest payment is reinvested to earn further interest in future periods. By contrast, if no interest is earned on interest the investment earns only simple interest. In such a case the investment grows as follows:

$$\text{Future value} = \text{Present value} [1 + \text{Number of years} \times \text{Interest rate}]$$

For example, an investment of Rs. 1,000, if invested at 12 percent simple interest rate will in 5 years time become :

$$1,000 [1 + 5 \times 0.12] = \text{Rs. } 1,600$$

Exhibit 6.3 shows how an investment of Rs. 1,000 grows over time under simple interest as well as compound interest when the interest rate is 12 percent. From this exhibit you can feel the power of compound interest. As Albert Einstein once remarked: "I don't know what the seven wonders of the world are, but I know the eighth—compound interest". You may be wondering why your ancestors did not display foresight. Hopefully, you will show concern for your posterity.

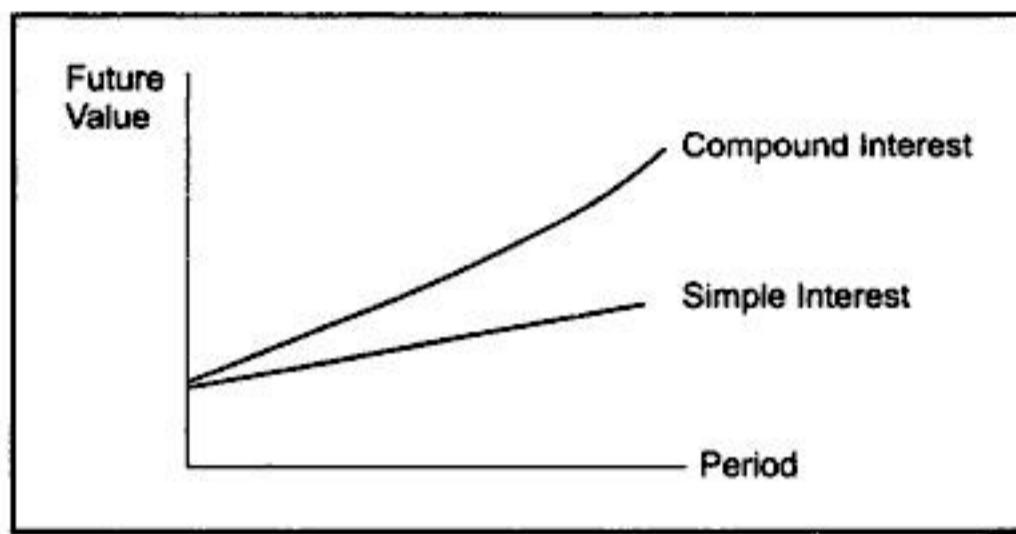
Exhibit 6.3 Value of Rs. 1000 Invested at 10 percent Simple and Compound Interest

Year	Simple Interest				Compound Interest					
	Starting Balance	+ Interest	=	Ending Balance	Starting Balance	+ Interest	=	Ending Balance		
1	1,000	+	100	=	1100	1000	+	100	=	1100
5	1,400	+	100	=	1500	1464	+	146	=	1610
10	1,900	+	100	=	2000	2358	+	236	=	2594
20	2,900	+	100	=	3000	6116	+	612	=	6728
50	5,900	+	100	=	6000	106,718	+	10672	=	117,390
100	10,900	+	100	=	11000	12,527,829	+	1,252,783	=	13,780,612

Exhibit 6.4 shows graphically how money grows under simple interest and compound interest. Note that under simple interest the growth is linear and under compound interest the growth is exponential.

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 6.2 we find that when the interest rate is 12 percent it takes about 6 years to double the amount, when the interest is 6 percent 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

Exhibit 6.4 Graphic View of Simple and Compound Interest

interest rate. For example, if the interest rate is 8 percent, the doubling period is about 9 years ($72/8$). Likewise, if the interest rate is 4 percent 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 percent and 15 percent.

<i>Interest Rate</i>	<i>Doubling Period</i>
10 percent	$0.35 + \frac{69}{10} = 7.25$ years
15 percent	$0.35 + \frac{69}{15} = 4.95$ years

Finding the Growth Rate

The formula we used to calculate future value is quite general and it can be applied to answer other types of questions related to growth. Suppose your company currently has 5,000 employees and this number is expected to grow by 5 percent per year. How many employees will your company have in 10 years? The number of employees 10 years hence will be:

$$5,000 \times (1.05)^{10} = 5000 \times 1.629 = 8,145$$

Consider another example. Phoenix Limited had revenues of Rs. 100 million in 1990 which increased to Rs. 1000 million in 2000. What was the compound growth rate in revenues? The compound growth rate may be calculated as follows:

$$100 (1 + g)^{10} = 1,000$$

$$(1 + g)^{10} = \frac{1000}{100} = 10$$

$$(1 + g) = 10^{1/10} \\ g = 10^{1/10} - 1 \\ = 1.26 - 1 = 0.26 \text{ or } 26 \text{ percent}$$

6.3 ■ PRESENT VALUE OF A SINGLE AMOUNT

Suppose someone promises to give you Rs. 1,000 three years hence. What is the present value of this amount if the interest rate is 10 percent? The present value can be calculated by discounting Rs. 1,000, to the present point of time, as follows :

Value three years hence = Rs. 1,000

$$\text{Value two years hence} = \text{Rs. } 1,000 \left(\frac{1}{1.10} \right)$$

$$\text{Value one year hence} = \text{Rs. } 1,000 \left(\frac{1}{1.10} \right) \left(\frac{1}{1.10} \right)$$

$$\text{Value now} = \text{Rs. } 1,000 \left(\frac{1}{1.10} \right) \left(\frac{1}{1.10} \right) \left(\frac{1}{1.10} \right)$$

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:

$$FV_n = PV (1 + r)^n \quad (6.2)$$

Dividing both the sides of Eq. (6.2) by $(1 + r)^n$, we get :

$$PV = FV_n [1 / (1 + r)^n] \quad (6.3)$$

The factor $1/(1+r)^n$ in Eq. (6.3) is called the discounting factor or the present value interest factor ($PVIF_{r,n}$). Exhibit 6.5 gives the value of $PVIF_{r,n}$ for several combinations of r and n . A more detailed table of $PVIF_{r,n}$ is given in Appendix A at the end of this book.

Exhibit 6.5 Value of $PVIF_{r,n}$ for Various Combinations of r and n

<i>n/r</i>	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	0.565	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

What is the present value of Rs. 1,000 receivable 6 years hence if the rate of discount is 10 percent ?

The present value is:

$$\text{Rs. } 1,000 \times PVIF_{10\%, 6} = \text{Rs. } 1,000(0.565) = \text{Rs. } 565$$

What is the present value of Rs. 1,000 receivable 20 years hence if the discount rate is 8 percent? Since Exhibit 6.5 does not have the value of $PVIF_{8\%,20}$ we obtain the answer as follows:

$$\begin{aligned} \text{Rs. } 1,000 \left(\frac{1}{1.08} \right)^2 &= \text{Rs. } 1,000 \left(\frac{1}{1.08} \right)^{10} \left(\frac{1}{1.08} \right)^{10} \\ &= \text{Rs. } 1,000 (PVIF_{8\%,10})(PVIF_{8\%,10}) \\ &= \text{Rs. } 1,000 (0.463)(0.463) = \text{Rs. } 214 \end{aligned}$$

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:

$$PV_n = \frac{A_1}{(1+r)} + \frac{A_2}{(1+r)^2} + \dots + \frac{A_n}{(1+r)^n} = \sum_{t=1}^n \frac{A_t}{(1+r)^t} \quad (6.4)$$

where, PV_n is the present value of a cash flow stream, A_t is the cash flow occurring at the end of year t , r is the discount rate, and n is the duration of the cash flow stream.

Exhibit 6.6 shows the calculation of the present value of an uneven cash flow stream, using a discount rate of 12 percent.

Exhibit 6.6 Present Value of an Uneven Cash Flow Stream

Year	Cash Flow Rs.	$PVIF_{12\%,n}$	Present Value of 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

Spreadsheet Analysis To calculate the present value of the cash flow stream given in Exhibit 6.6, 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 I2 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 cash flows. In the argument box that opens, fill in the given discount rate against Rate by giving the cell reference B3. In the space for Value 1, 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).

6.4 ■ FUTURE VALUE OF AN ANNUITY

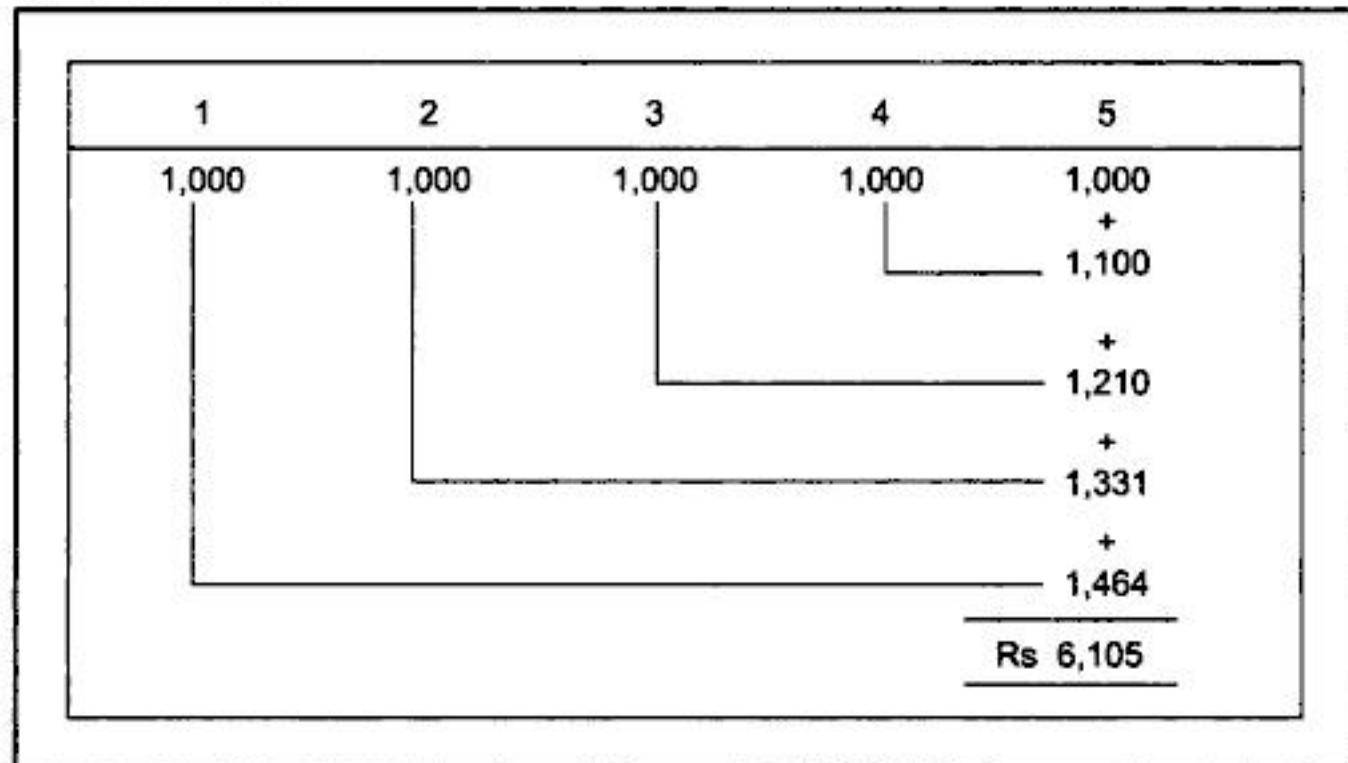
An annuity is a stream of constant cash flow (payment or receipt) occurring at regular intervals of time. The premium payments of a life insurance policy, for example, are an annuity. When the cash flows occur at the end of each period the annuity is called an ordinary annuity or a *deferred annuity*. 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 Rs. 1,000 annually in a bank for 5 years and your deposits earn a compound interest rate of 10 percent. 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:

$$\begin{aligned} & \text{Rs. } 1,000(1.10)^4 + \text{Rs. } 1,000(1.10)^3 + \text{Rs. } 1,000(1.10)^2 + \text{Rs. } 1,000(1.10) + \text{Rs. } 1,000 \\ &= \text{Rs. } 1,000(1.464) + \text{Rs. } 1,000(1.331) + \text{Rs. } 1,000(1.21) + \text{Rs. } 1,000(1.10) + \text{Rs. } 1,000 \\ &= \text{Rs. } 6,105 \end{aligned}$$

The time line for this annuity is shown in Exhibit 6.7.

Exhibit 6.7 Time Line for an Annuity



Formula

In general terms the future value of an annuity is given by the following formula:

$$\begin{aligned} FVA_n &= A (1 + r)^{n-1} + A (1 + r)^{n-2} + \dots + A \\ &= A [(1 + r)^n - 1] / r \end{aligned} \quad (6.5)^1$$

where FVA_n is the future value of an annuity which has a duration of n periods, A is the constant periodic flow, r is the interest rate per period, and n is the duration of the annuity.

The term $[(1 + r)^n - 1] / r$ is referred to as the future value interest factor for an annuity ($FVIFA_{r,n}$). The value of this factor for several combinations of r and n is given in Exhibit 6.8. A more detailed table is given in Appendix A at the end of this book.

Exhibit 6.8 Value of $FVIFA_{r,n}$ for Various Combinations of r and n

n/r	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
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

Applications

The future value annuity formula can be applied in a variety of contexts. Its important applications are illustrated below.

Knowing What Lies in Store for You Suppose you have decided to deposit Rs. 30,000 per year in your Public Provident Fund Account for 30 years. What will be the accumulated amount in your Public Provident Fund Account at the end of 30 years if the interest rate is 11 percent?

¹ The formula for the future value of an annuity is derived as follows:

The future value of an annuity is:

$$FVA_n = A (1 + r)^{n-1} + A (1 + r)^{n-2} + \dots + A (1 + r) + A \quad (1)$$

Multiplying both the sides of (1) by $(1 + r)$ gives:

$$FVA_n (1 + r) = A (1 + r)^n + A (1 + r)^{n-1} + \dots + A (1 + r)^2 + A (1 + r) \quad (2)$$

Subtracting (1) from (2) yields:

$$FVA_n r = A [(1 + r)^n - 1] \quad (3)$$

Dividing both the sides of (3) by r gives:

$$FVA_n = \left(\frac{(1 + r)^n - 1}{r} \right) \quad (4)$$

The accumulated sum will be:

$$\begin{aligned} \text{Rs. } 30,000 & (\text{FVIFA}_{11\%, 30 \text{ yrs}}) \\ &= \text{Rs. } 30,000 \left[\frac{(1.11)^{30} - 1}{.11} \right] \\ &= \text{Rs. } 30,000 [199.02] \\ &= \text{Rs. } 5,970,600 \end{aligned}$$

How Much Should You Save Annually You want to buy a house after 5 years when it is expected to cost Rs. 2 million. How much should you save annually if your savings earn a compound return of 12 percent?

The future value interest factor for a 6 year annuity, given an interest rate of 12 percent, is:

$$\text{FVIFA}_{n=5, r=12\%} = \frac{(1 + 0.12)^5 - 1}{0.12} = 6.353$$

The annual savings should be :

$$\frac{\text{Rs. } 20,000,00}{6.353} = \text{Rs. } 314,812$$

Annual Deposit in a Sinking Fund Futura Limited has an obligation to redeem Rs. 500 million bonds 6 years hence. How much should the company deposit annually in a sinking fund account wherein it earns 14 percent interest to cumulate Rs. 500 million in 6 years time?

The future value interest factor for a 6 year annuity, given an interest rate of 14 percent is:

$$\text{FVIFA}_{n=6, r=14\%} = \frac{(1 + 0.14)^6 - 1}{0.14} = 8.536$$

The annual sinking fund deposit should be:

$$\frac{\text{Rs. } 500 \text{ million}}{8.536} = \text{Rs. } 58.575 \text{ million}$$

Finding the Interest Rate A finance company advertises that it will pay a lump sum of Rs. 8,000 at the end of 6 years to investors who deposit annually Rs. 1,000 for 6 years. What interest rate is implicit in this offer?

The interest rate may be calculated in two steps :

- Find the $\text{FVIFA}_{r,6}$ for this contract as follows :

$$\text{Rs. } 8,000 = \text{Rs. } 1,000 \times \text{FVIFA}_{r,6}$$

$$\text{FVIFA}_{r,6} = \frac{\text{Rs. } 8,000}{\text{Rs. } 1,000} = 8.000$$

- Look at the $\text{FVIFA}_{r,n}$ table and read the row corresponding to 6 years until you find a value close to 8.000. Doing so, we find that

$$\text{FVIFA}_{12\%, 6} \text{ is } 8.115$$

So, we conclude that the interest rate is slightly below 12 percent.

How Long Should You Wait You want to take up a trip to the moon which costs Rs. 1,000,000 – the cost is expected to remain unchanged in nominal terms. You can save annually Rs. 50,000 to fulfill your desire. How long will you have to wait if your savings earn an interest of 12 percent?

The future value of an annuity of Rs. 50,000 that earns 12 percent is equated to Rs. 1,000,000.

$$50,000 \times FVIFA_{n=?, 12\%} = 1,000,000$$

$$50,000 \times \left[\frac{1.12^n - 1}{0.12} \right] = 1,000,000$$

$$1.12^n - 1 = \frac{1,000,000}{50,000} \times 0.12 = 2.4$$

$$1.12^n = 2.4 + 1 = 3.4$$

$$n \log 1.12 = \log 3.4$$

$$n \times 0.0492 = 0.5315$$

$$n = \frac{0.5315}{0.0492} = 10.8 \text{ years}$$

You will have to wait for about 11 years.

Calculations Using a Spreadsheet

In Microsoft Excel™, there are built-in formulas for calculating the Present Value (PV), Future Value (FV), equal periodic receipt/payment (Pmt), number of periods (N_{per}), interest/discount rate (Rate). The notations inside the brackets are the ones used in Excel for the respective parameters. Let us recalculate the following problem using Excel.

A finance company advertises that it will pay a lump sum of Rs. 8,000 at the end of 6 years to investors who deposit annually Rs. 1,000 for 6 years. What interest rate is implicit in this offer?

In the spreadsheet below, fill in the FV in cell B1, periods in years (N_{per}) in cell B2, and periodic payments (Pmt) in cell B3, showing receipts as positive values and payments as negative values. To get the interest rate in cell E2, select E2 and type =. Then click on Insert and in the drop-down menu click on the icon f_x . A dialogue box opens from which select the category Financial and the function RATE. A Function argument box opens in which fill in the given values of N_{per} , Pmt, and FV by giving the respective cell references, viz. B2, B3, and B1. Leave the box for PV blank as it is not relevant here. In the box for Type, type 0 or leave it blank, to denote that the periodic payments occur at the end of the periods (where they occur at the beginning of the periods, you have to enter 1). Then click on the button OK to get the result. Alternatively just select B4 and type = RATE(B2, B3, B1) and press enter to get the result. Here carefully note that inside the bracket, between B3 and B1, there should be two commas in succession, as the field for PV is mandatory though it has no value in this case.

	A	B	C	D	E
1	Future value (FV)	8,000			
2	Periods in years (N _{per})	6		→	11.43%
3	Periodic payment (Pmt)	-1,000	= RATE(B2, B3, B1)		

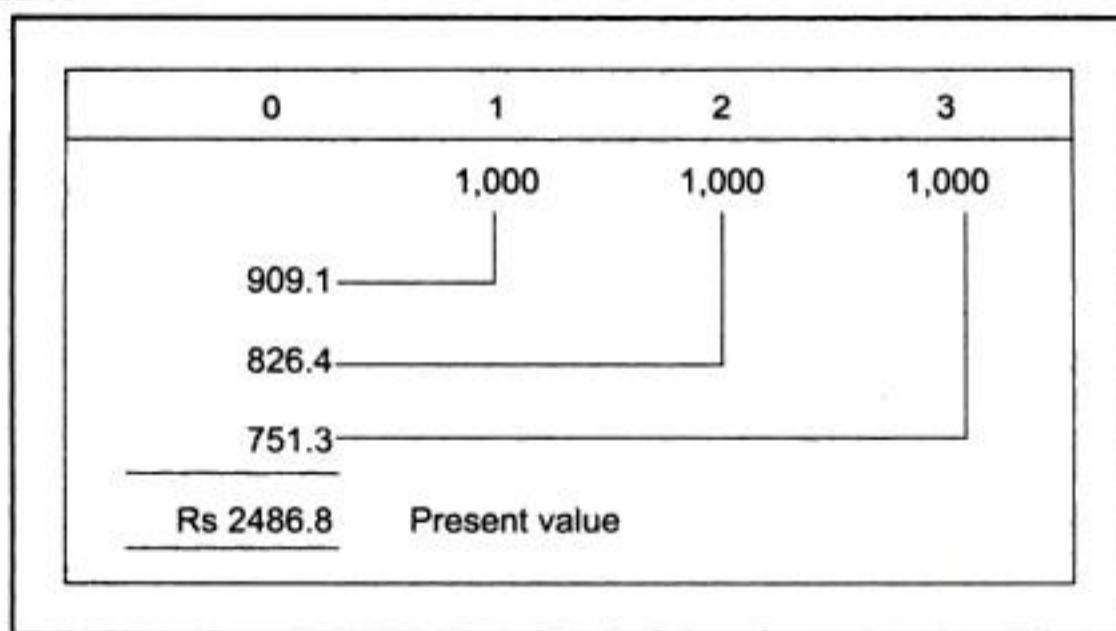
6.5 ■ PRESENT VALUE OF AN ANNUITY

Suppose you expect to receive Rs. 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 percent? The present value of this annuity is simply the sum of the present values of all the inflows of this annuity:

$$\begin{aligned} & \text{Rs. } 1,000 \left(\frac{1}{1.10} \right) + \text{Rs. } 1,000 \left(\frac{1}{1.10} \right)^2 + \text{Rs. } 1,000 \left(\frac{1}{1.10} \right)^3 \\ & = \text{Rs. } 1,000 \times 0.9091 + \text{Rs. } 1,000 \times 0.8264 + \text{Rs. } 1,000 \times 0.7513 \\ & = \text{Rs. } 2486.8 \end{aligned}$$

The time line for this problem is shown in Exhibit 6.9.

Exhibit 6.9 Time Line



Formula

In general terms the present value of an annuity may be expressed as follows:

$$\begin{aligned} PVA_n &= \frac{A}{(1+r)} + \frac{A}{(1+r)^2} + \dots + \frac{A}{(1+r)^{n+1}} + \frac{A}{(1+r)^n} \\ &= A \left[\frac{1}{(1+r)} + \frac{1}{(1+r)^2} + \dots + \frac{1}{(1+r)^{n+1}} + \frac{1}{(1+r)^n} \right] \end{aligned}$$

$$= A \left[\left\{ 1 - (1/1 + r)^n \right\} / r \right] \quad (6.6)^2$$

where PVA_n is the present value of an annuity which has a duration of n periods, A is the constant periodic flow, and r is the discount rate.

$\left[\left\{ 1 - (1/1 + r)^n \right\} / r \right]$ is referred to as the present value interest factor for an annuity ($PVIFA_{r,n}$). It is, as can be seen clearly, simply equal to the product of the future value interest factor for an annuity ($FVIFA_{r,n}$) and the present value interest factor ($PVIF_{r,n}$). Exhibit 6.10 shows the value of $PVIFA_{r,n}$ for several combinations of r and n . A more detailed table of $PVIFA_{r,n}$ values is found in Appendix A at the end of this book.

Exhibit 6.10 Value of $PVIFA_{r,n}$ for Different Combinations of r and n

n/r	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

Applications

The present value annuity formula can be applied in a variety of contexts. Its important applications are discussed below.

How Much Can You Borrow for a Car After reviewing your budget, you have determined that you can afford to pay Rs. 12,000 per month for 3 years toward a new car. You call a finance company and learn that the going rate of interest on car finance is 1.5 percent per month for 36 months. How much can you borrow?

To determine how much you can borrow, we have to calculate the present value of Rs. 12,000 per month for 36 months at 1.5 percent per month.

Since the loan payments are an ordinary annuity, the present value interest factor of annuity is:

$$PVIFA_{r,n} = \frac{1 - \frac{1}{(1+r)^n}}{r} = \frac{1 - \frac{1}{(1.015)^{36}}}{0.15} = 27.70$$

² The formula for the present value of an annuity is derived as follows:

$$PVA_n = A (1+r)^{-1} + A (1+r)^{-2} + \dots + A (1+r)^{-n} \quad (1)$$

Multiplying both the sides of (1) by $(1+r)$ gives :

$$PVA_n (1+r) = A + A (1+r)^{-1} + \dots + A (1+r)^{-n+1} \quad (2)$$

Subtracting (1) from (2) yields :

$$PVA_n r = A [1 - (1+r)^{-n}] = A \left[\left\{ (1+r)^n - 1 \right\} / (1+r)^n \right] \quad (3)$$

Dividing both the sides of (3) by r results in :

$$PVA_n = A \left[\left\{ (1+r)^n - 1 \right\} / r (1+r)^n \right] = A \left[\left\{ 1 - (1/1+r)^n \right\} / r \right] \quad (4)$$

Hence the present value of 36 payments of Rs. 12,000 each is:

$$\text{Present value} = \text{Rs. } 12,000 \times 27.70 = \text{Rs. } 332,400$$

You can, therefore, borrow Rs. 332,400 to buy the car.

The above can be worked out as a **spreadsheet** as shown below:

	A	B	C	D	E	F
1	Monthly payment (Pmt)	-12,000				
2	Period in months (N_{per})	36	= PV(B3,B2,B1)			
3	Rate of interest per month (Rate)	1.50%			→	331,928

Period of Loan Amortisation You want to borrow Rs. 1,080,000 to buy a flat. You approach a housing finance company which charges 12.5 percent interest. You can pay Rs. 180,000 per year toward loan amortisation. What should be the maturity period of the loan?

The present value of annuity of Rs. 180,000 is set equal to Rs. 1,080,000.

$$180,000 \times PVIFA_{n,r} = 1,080,000$$

$$180,000 \times PVIFA_{n=?, r=12.5\%} = 1,080,000$$

$$180,000 \left(\frac{1 - \frac{1}{(1.125)^n}}{0.125} \right) = 1,080,000$$

Given this equality the value of n is calculated as follows:

$$\frac{1 - \frac{1}{(1.125)^n}}{0.125} = \frac{1,080,000}{180,000} = 6$$

$$\frac{1}{(1.125)^n} = 0.25$$

$$1.125^n = 4$$

$$n \log 1.125 = \log 4$$

$$n \times 0.0512 = 0.6021$$

$$n = \frac{0.6021}{0.0512} = 11.76 \text{ years}$$

You can perhaps request for a maturity of 12 years.

Determining the 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 break up 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 Rs.1,000,000 at an interest rate of 15 percent and the loan is to be repaid in 5 equal installments payable at the end of each of the next 5 years. The annual installment payment A is obtained by solving the following equation.

$$\text{Loan amount} = A \times \text{PVIFA}_{n=5, r=15\%}$$

$$1,000,000 = A \times 3.3522$$

$$\text{Hence } A = 298,312$$

The amortisation schedule is shown in Exhibit 6.11. The interest component is the largest for year 1 and progressively declines as the outstanding loan amount decreases.

Exhibit 6.11 Loan Amortisation Schedule

Year	Beginning Amount (1)	Annual Installment (2)	Interest (1) $\times 0.15 = (3)$	Principal Repayment (2) - (3) = (4)	Remaining Balance (1) - (4) = (5)
1	1,000,000	298,312	150,000	148,312	851,688
2	851,688	298,312	127,753	170,559	681,129
3	681,129	298,312	102,169	196,143	485,986
4	485,986	298,312	72,482	225,564	259,422
5	259,422	298,312	38,913	259,399	23

The above schedule can be set up using a **spreadsheet** as below:

	A	B	C	D	E	F
1		Present value	Interest rate	No. of installments (in years)	Annual installment amount	
2		1,000,000	15%	5	-298,316	
3	Year	Beginning amount	Annual installment	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	581,121
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. Use the financial function PMT to get the annual 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 (\$E\$2). This will make the value in this cell absolute, that is, constant throughout. Use the formula =B4*\$C\$2 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 to the fill handle (it will turn into a black cross) and drag it down up to C8. This will autofill the value in C4 (whether an absolute value or a formula) up to 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.

Determining the Periodic Withdrawal Your father deposits Rs. 300,000 on retirement in a bank which pays 10 percent annual interest. How much can be withdrawn annually for a period of 10 years?

$$\begin{aligned} A &= \text{Rs. } 300,000 \times \frac{1}{\text{PVIFA}_{10\%, 10}} \\ &= \text{Rs. } 300,000 \times \frac{1}{6.145} \\ &= \text{Rs. } 48,819 \end{aligned}$$

A spreadsheet calculation of the above is as under.

	A	B	C	D	E
1	Initial deposit	(300,000)			
2	Interest rate	10%	= PMT(B2,B3,B1)	→	48,824
3	Period in years	10			

Finding the Interest Rate Suppose someone offers you the following financial contract: If you deposit Rs. 10,000 with him he promises to pay Rs. 2,500 annually for 6 years. What interest rate do you earn on this deposit? The interest rate may be calculated in two steps:
Step 1 Find the PVIFA_{r,6} for this contract by dividing Rs. 10,000 by Rs. 2,500

$$\text{PVIFA}_{r,6} = \frac{\text{Rs. } 10,000}{\text{Rs. } 2,500} = 4.000$$

Step 2 Look at the PVIFA table and read the row corresponding to 6 years until you find a value close to 4.000. Doing so, you find that

PVIFA_{12%,6} is 4.111 and PVIFA_{14%,6} is 3.889

Since 4.000 lies in the middle of these values the interest rate lies (approximately) in the middle. So, the interest rate is 13 percent.

Valuing an Infrequent Annuity Raghavan will receive an annuity of Rs. 50,000, payable once every two years. The payments will stretch out over 30 years. The first payment will be received at the end of two years. If the annual interest rate is 8 percent, what is the present value of the annuity?

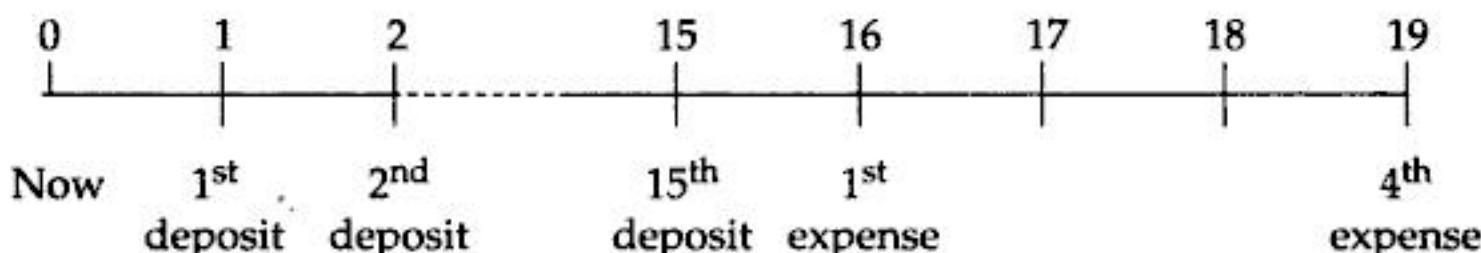
The interest rate over a two-year period is, $(1.08) \times (1.08) - 1 = 16.64$ percent. This means that Rs. 100 invested over two years will yield Rs. 116.64.

We have to calculate the present value of a Rs. 50,000 annuity over 15 periods, with an interest rate of 16.64 percent per period. This works out to:

$$\text{Rs. } 50,000 [\{ 1 - (1/1.1664)^{15} \}] / 0.1664 = \text{Rs. } 270,620$$

Equating Present Value of Two Annuities Ravi wants to save for the college education of his son, Deepak. Ravi estimates that the college education expenses will be rupees one million per year for four years when his son reaches college in 16 years—the expenses will be payable at the beginning of the years. He expects the annual interest rate of 8 percent over the next two decades. How much money should he deposit in the bank each year for the next 15 years (assume that the deposit is made at the end of the year) to take care of his son's college education expenses?

The time line for this problem is as follows:



The present value of college education expenses when his son becomes 15 years old is:

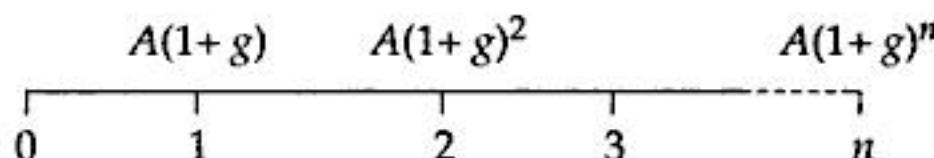
$$\begin{aligned} & \text{Rs. } 1,000,000 \times \text{PVIFA (4 years, 8\%)} \\ &= \text{Rs. } 1,000,000 \times 3.312 = \text{Rs. } 3,312,000 \end{aligned}$$

The annual deposit to be made so that the future value of the deposits at the end of 15 years is Rs. 3,312,000 is:

$$\begin{aligned} A &= \frac{\text{Rs. } 3,312,000}{\text{FVIFA (15 years, 8\%)}} = \frac{\text{Rs. } 3,312,000}{27.152} \\ &= \text{Rs. } 121,980 \end{aligned}$$

Present Value of a Growing Annuity

A cash flow that grows at a constant rate for a specified period of time is a growing annuity. The time line of a growing annuity is shown below:



The present value of a growing annuity can be determined using the following formula:

$$\text{PV of a Growing Annuity} = A(1+g) \left(\frac{1 - \frac{(1+g)^n}{(1+r)^n}}{r-g} \right) \quad (6.7)^3$$

The above formula can be used when the growth rate is less than the discount rate ($g < r$) as well as when the growth rate is more than the discount rate ($g > r$). However, it does not work when the growth rate is equal to the discount rate ($g = r$)—in this case, the present value is simply equal to $n A$.

For example, suppose you have the right to harvest a teak plantation for the next 20 years over which you expect to get 100,000 cubic feet of teak per year. The current price per cubic feet of teak is Rs. 500, but it is expected to increase at a rate of 8 percent per year. The discount rate is 15 percent. The present value of the teak that you can harvest from the teak forest can be determined as follows:

$$\begin{aligned} \text{PV of teak} &= \text{Rs. } 500 \times 100,000 (1.08) \left(\frac{1 - \frac{108^{20}}{1.15^{20}}}{0.15 - 0.08} \right) \\ &= \text{Rs. } 551,736,683 \end{aligned}$$

A Note on Annuities Due

So far we discussed ordinary annuities in which cash flows occur at the end of each period. There is a variation, which is fairly common, in which cash flows occur at the beginning of each period. Such an annuity is called an *annuity due*. For example, when you enter into a

³ The formula for the present value of a growing annuity (PVGA) is derived as follows :

$$\text{PVGA} = \frac{A(1+g)}{(1+r)} + \frac{A(1+g)^2}{(1+r)^2} + \dots + \frac{A(1+g)^n}{(1+r)^n} \quad (1)$$

Multiplying both the sides of (1) by $(1+g)/(1+r)$ gives :

$$\text{PVGA} \times \frac{(1+g)}{(1+r)} = \frac{A(1+g)^2}{(1+r)^2} + \frac{A(1+g)^3}{(1+r)^3} + \dots + \frac{A(1+g)^{n+1}}{(1+r)^{n+1}} \quad (2)$$

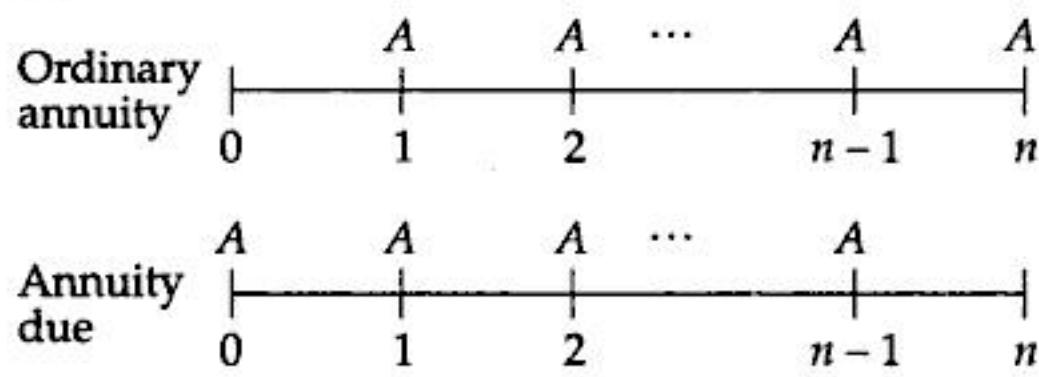
Subtracting (2) from (1) yields:

$$\text{PVGA} \left(1 - \frac{(1+g)}{(1+r)} \right) = \frac{A(1+g)}{(1+r)} - \frac{A(1+g)^{n+1}}{(1+r)^{n+1}} \quad (3)$$

This simplifies to:

$$\text{PVGA} = A(1+g) \left(\frac{1 - \frac{(1+g)^n}{(1+r)^n}}{r-g} \right) \quad (4)$$

lease for an apartment, the lease payments are due at the beginning of the month. The first lease payment is made at the beginning; the second lease payment is due at the beginning of the second month; so on and so forth. The time lines for ordinary annuity and annuity due are shown below:



Since the cash flows of an annuity due occur one period earlier in comparison to the cash flows on an ordinary annuity, the following relationship holds:

$$\text{Annuity due value} = \text{Ordinary annuity value} \times (1 + r)$$

This applies for both present and future values. So, two steps are involved in calculating the value of an annuity due. First, calculate the present or future value as though it were an ordinary annuity. Second, multiply your answer by $(1 + r)$.

6.6 ■ PRESENT VALUE OF A PERPETUITY

A perpetuity is an annuity of infinite duration. For example, the British government has issued bonds called consols which pay yearly interest forever.

Present Value of a Perpetuity

The present value of a perpetuity may be expressed as follows:

$$P_{\infty} = A \times \text{PVIFA}_{r,\infty} \quad (6.8)$$

where P_{∞} is the present value of a perpetuity and A is the constant annual payment. What is the value of $\text{PVIFA}_{r,\infty}$? It is equal to:

$$\sum_{t=1}^{\infty} \frac{1}{(1+r)^t} = \frac{1}{r} \quad (6.9)^4$$

⁴ The formula for $\text{PVIFA}_{r,\infty}$ is derived as follows :

$$\text{PVIFA}_{r,\infty} = 1(1+r)^{-1} + 1(1+r)^{-2} + \dots + 1(1+r)^{-\infty} \quad (1)$$

Multiplying both the sides of (1) by $(1+r)$ gives :

$$\text{PVIFA}_{r,\infty} (1+r) = 1 + 1(1+r)^{-1} + \dots + 1(1+r)^{-\infty+1} \quad (2)$$

Subtracting (1) from (2) yields :

$$\text{PVIFA}_{r,\infty} \times r = 1 - 1(1+r)^{-\infty} \quad (3)$$

Since the second term on the right hand side of (3) vanishes, we get :

$$\text{PVIFA}_{r,\infty} \times r = 1 \quad (4)$$

This results in:

$$\text{PVIFA}_{r,\infty} = \frac{1}{r} \quad (5)$$

Put in words, it means that the present value interest factor of a perpetuity 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 Rs. 10,000 if the interest rate is 10 percent is equal to: $\text{Rs. } 10,000 / 0.10 = \text{Rs. } 100,000$. Intuitively this is quite convincing because an initial sum of Rs. 100,000 would, if invested at a rate of interest of 10 percent, provide a constant annual income of Rs. 10,000 for ever without any impairment of the capital value.

Growing Perpetuity

An office complex is expected to generate a net rental of Rs. 3 million next year, which is expected to increase by 5 percent every year. If we assume that the increase will continue indefinitely, the rental stream is a growing perpetuity. If the discount rate is 10 percent, the present value of the rental stream is:

$$PV = \frac{3,000,000}{(1.10)} + \frac{3,000,000(1.05)}{(1.10)^2} + \dots + \frac{3,000,000(1.05)^{n-1}}{(1.10)^n} + \dots$$

Algebraically, it may be expressed as follows:

$$PV = \frac{C}{(1+r)} + \frac{C(1+g)}{(1+r)^2} + \frac{C(1+g)^2}{(1+r)^3} + \dots + \frac{C(1+g)^{n-1}}{(1+r)^n} + \dots \quad (6.10)$$

where C is the rental to be received a year hence, g is the rate of growth per year, and r is the discount rate.

While Eq. (6.10) looks daunting, it reduces itself to the following simplification.

$$PV = \frac{C}{r - g} \quad (6.11)$$

6.7 INTRA-YEAR COMPOUNDING AND DISCOUNTING

So far we assumed that compounding is done annually. Now we consider the case where compounding is done more frequently. Suppose you deposit Rs. 1,000 with a finance company which advertises that it pays 12 percent 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	=Rs. 1,000.0
	Interest for 6 months	=Rs. 60.0
	$Rs. 1,000 \times \frac{.12}{2}$	
	Principal at the end	=Rs. 1,060.0
Second six months	: Principal at the beginning	=Rs. 1,060.0
	Interest for 6 months	= Rs. 63.6
	$Rs. 1,060 \times \frac{.12}{2}$	
	Principal at the end	=Rs. 1,123.6

Note that if compounding is done annually, the principal at the end of one year would be Rs. 1,000 $(1.12) = \text{Rs. } 1,120$. The difference of Rs. 3.6 (between Rs. 1,123.6 under semi-annual compounding and Rs. 1,120 under annual compounding) represents interest on interest for the second half year.

The general formula for the future value of a single cash flow after n years when compounding is done m times a year is:

$$FV_n = PV \left(1 + \frac{r}{m}\right)^{m \times n} \quad (6.12)$$

Suppose you deposit Rs. 5,000 in a bank for 6 years. If the interest rate is 12 percent and the frequency of compounding is 4 times a year your deposit after 6 years will be:

$$\begin{aligned} \text{Rs. } 5,000 \left(1 + \frac{0.12}{4}\right)^{4 \times 6} &= \text{Rs. } 5,000 (1.03)^{24} \\ &= \text{Rs. } 5,000 \times 2.0328 = \text{Rs. } 10,164 \end{aligned}$$

Effective versus Stated Rate

We have seen above that Rs. 1,000 grows to Rs. 1,123.6 at the end of a year if the stated rate of interest is 12 percent and compounding is done semi-annually. This means that Rs. 1,000 grows at the rate of 12.36 percent per annum. The figure of 12.36 percent is called the effective interest rate—the rate of interest under annual compounding which produces the same result as that produced by an interest rate of 12 percent under semi-annual compounding.

The general relationship between the effective interest rate and the stated annual interest rate is as follows:

$$\text{Effective interest rate} = \left(1 + \frac{\text{Stated annual interest rate}}{m}\right)^m - 1$$

where m is the frequency of compounding per year.

Suppose a bank offers 12 percent stated annual interest rate. What will be the effective interest rate when compounding is done annually, semiannually, and quarterly?

$$\text{Effective interest rate with annual compounding} = \left(1 + \frac{0.12}{1}\right)^1 - 1 = 0.12$$

$$\text{Effective interest rate with semi-annual compounding} = \left(1 + \frac{0.12}{2}\right)^2 - 1 = 0.1236$$

$$\text{Effective interest rate with quarterly compounding} = \left(1 + \frac{0.12}{4}\right)^4 - 1 = 0.1255$$

When compounding becomes continuous, the effective interest rate is expressed as follows:

$$\text{Effective interest rate} = e^r - 1 \quad (6.13)$$

where e is the base of natural logarithm and r is the stated interest rate.

Exhibit 6.12 shows how compounding frequency impacts on the effective interest rate. From this exhibit is clear that 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 6.12 Compounding Frequency and Effective Interest Rate

Frequency	Stated Interest Rate (%)	m	Formula	Effective Interest Rate
			Rate (%)	
Annual	12	1	0.12	12.00
Semi-annual	12	2	$\left(\frac{1+0.12}{2}\right)^2 - 1$	12.36
Quarterly	12	4	$\left(\frac{1+0.12}{4}\right)^4 - 1$	12.55
Monthly	12	12	$\left(\frac{1+0.12}{12}\right)^{12} - 1$	12.68
Weekly	12	52	$\left(\frac{1+0.12}{52}\right)^{52} - 1$	12.73
Daily	12	365	$\left(\frac{1+0.12}{365}\right)^{365} - 1$	12.75
Continuous	12		$e^{0.12} - 1$	12.75

Shorter Discounting Periods

Sometimes cash flows 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:

$$PV = FV_n \left(\frac{1}{1+r/m} \right)^{mn} \quad (6.14)$$

where PV is the present value, FV_n is the cash flow after n years, m is the number of times per year discounting is done, and r is the annual discount rate.

To illustrate, consider a cash flow of Rs. 10,000 to be received at the end of four years. The present value of this cash flow when the discount rate is 12 percent ($r = 12$ percent) and discounting is done quarterly ($m = 4$) is determined as follows:

$$\begin{aligned} PV &= \text{Rs. } 10,000 \times \text{PVIF}_{r/m, m \times n} \\ &= \text{Rs. } 10,000 \times \text{PVIF}_{3\%, 16} \\ &= \text{Rs. } 10,000 \times 0.623 = \text{Rs. } 6,230 \end{aligned}$$

SUMMARY

- Money has time value. A rupee today is more valuable than a rupee a year hence.
- When cash flows occur at different points in time, it is easier to deal with them using a time line. A **time line** shows the timing and the amount of each cash flow in a cash flow stream.
- The process of investing money as well as reinvesting the interest earned thereon is called **compounding**. The future or compounded value of an investment after n years when the interest rate is r percent is:

$$\text{Future value}_n = \text{Present value} (1 + r)^n$$

- If no interest is earned on interest the investment earns only simple interest. In such a case the investment grows as follows:

$$\text{Future value} = \text{Present value} [1 + nr]$$

- According to the **rule of 72**, the doubling period under compounding is obtained by dividing 72 by the interest rate.
- The process of **discounting**, used for calculating the present value, is simply the inverse of compounding. The present value formula is:

$$PV = FV_n [1/(1 + r)^n]$$

- The present value of a cash flow is equal to:

$$PV_n = \sum_{t=1}^n \frac{A_t}{(1+r)^t}$$

- An **annuity** is a stream of constant cash flow (payment or receipt) occurring at regular intervals of time. 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.
- The future value of an annuity is given by the formula:

$$FVA_n = A [(1 + r)^n - 1] / r$$

- The present value of an annuity is given by the formula:

$$PVA_n = A [1 - (1 + r)^n] / r$$

- A cash flow that grows at a constant rate for a specified period of time is a growing annuity. The present value of a **growing annuity** is given by the following formula:

$$PV \text{ of a Growing Annuity} = A(1 + g) \left[\frac{1 - (1 + g)^n}{1 - (1 + r)^n} \right] / r - g$$

- Since the cash flows of an annuity due occur one period earlier in comparison to the cash flows of an ordinary annuity, the following relationship holds:

$$\text{Annuity due value} = \text{Ordinary annuity value} \times (1 + r)$$

- A **perpetuity** is an annuity of infinite duration. The present value of a perpetuity is:
Present value of a perpetuity = A/r

- The general formula for the future value of a single cash flow after n years when compounding is done m times a year is:

$$FV_n = PV [1 + r/m]^{mn}$$

- The relationship between **effective interest rate** and the **stated annual interest rate** is as follows:

$$\text{Effective interest rate} = \left(\frac{1 + \text{Stated annual interest rate}}{m} \right)^m - 1$$

- When compounding becomes continuous the effective interest rate is expressed as:

$$\text{Effective interest rate} = e^r - 1$$

- The formula for calculating the present value in the case of shorter compounding period is:

$$PV = FV_n [1/(1 + r/m)]^{mn}$$

QUESTIONS

- Why does money have time value?
- State the general formula for the future value of a single amount.
- What is the difference between compound and simple interest?
- Explain the rule of 72.
- Explain the rule of 69. How does it compare with the rule of 72?
- State the general formula for calculating the present value of a single amount.
- What is an annuity? What is the difference between an ordinary annuity and an annuity due?
- State the formula for the future value of an annuity.
- State the formula for the present value of an annuity.
- What is a growing annuity? What is the formula for finding the present value of a growing annuity?
- What is the formula for the present value of a perpetuity?
- State the formula for the future value of a single cash flow after n years when compounding is done m times a year.
- What is the relationship between the effective interest rate and the stated interest rate?
- State the formula for calculating the present value of a single cash flow when discounting is done m times a year.
- A firm's earnings grew from Re. 1 per share to Rs. 3 per share over a period of 10 years. The total growth was 200 percent, but the annual compound growth rate was less than 20 percent. Why?

SOLVED PROBLEMS

- 6.1 If you invest Rs. 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 Rs. 5,000 after 75 years, when it earns a compound interest of 9 per cent, is

$$\text{Rs. } 5,000 (1.09)^{75}$$

Since the FVIF table given in Appendix A has a maximum period of 30, the future value expression may be stated as

$$\text{Rs. } 5,000 (1.09)^{30} (1.09)^{30} (1.09)^{15}$$

The above product is equal to

$$\text{Rs. } 5,000 (13.268) (13.268) (3.642) = \text{Rs. } 32,05,685.1$$

- 6.2 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

$$72/12 = 6 \text{ years}$$

As per the rule of 69, the doubling period will be

$$0.35 + \frac{69}{12} = 6.1 \text{ years}$$

- 6.3 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

$$\begin{aligned} \left(1 + \frac{0.16}{4}\right)^4 - 1 &= (1.04)^4 - 1 \\ &= 1.17 - 1 \\ &= 0.17 = 17 \text{ percent} \end{aligned}$$

- 6.4 Fifteen annual payments of Rs. 5,000 are made into a deposit account that pays 14 percent 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:

$$\text{Rs. } 5,000 (\text{FVIFA}_{14\%, 15}) = \text{Rs. } 5,000 (43.842) = \text{Rs. } 2,19,210$$

- 6.5 A finance company advertises that it will pay a lumpsum of Rs. 44,650 at the end of five years to investors who deposit annually Rs. 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:

$$\text{Rs. } 6,000 (\text{FVIFA}) = \text{Rs. } 44,650$$

So

$$\text{FVIFA} = \frac{\text{Rs. } 44,650}{\text{Rs. } 6,000} = 7.442$$

- (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

$$FVIFA_{20\%, 5 \text{ yrs}} \text{ is } 7.442$$

So, we conclude that the interest rate is 20 percent.

- 6.6 What is the present value of Rs. 1,000,000 receivable 60 years from now, if the discount rate is 10 percent?

Solution The present value is

$$\text{Rs. } 1,000,000 \left(\frac{1}{1.10} \right)^{60}$$

This may be expressed as

$$\begin{aligned} \text{Rs. } 1,000,000 & \left(\frac{1}{1.10} \right)^{30} \left(\frac{1}{1.10} \right)^{30} \\ & = \text{Rs. } 1,000,000 (0.057) (0.057) = \text{Rs. } 3249 \end{aligned}$$

- 6.7 A 12 – payment annuity of Rs. 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 percent?

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:

$$\begin{aligned} \text{Rs. } 10,000 (\text{PVIFA}_{14\%, 12 \text{ years}}) & = \text{Rs. } 10,000 (5.660) \\ & = \text{Rs. } 56,600 \end{aligned}$$

Step 2: Compute the present value of the amount obtained in Step 1:

$$\begin{aligned} \text{Rs. } 56,600 (\text{PVIF}_{14\%, 7 \text{ years}}) & = \text{Rs. } 56,600 (0.400) \\ & = \text{Rs. } 22,640 \end{aligned}$$

- 6.8 What is the present value of the following cash stream if the discount rate is 14 percent?

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	($\text{PVIFA}_{14\%, n}$)	Present Value
0	Rs. 5,000	1.000	Rs. 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
			Rs. 27,225

- 6.9 Mahesh deposits Rs. 200,000 in a bank account which pays 10 percent interest. How much can he withdraw annually for a period of 15 years?

Solution The annual withdrawal is equal to:

$$\frac{\text{Rs. } 200,000}{\text{PVIFA}_{10\%, 15\text{ yrs}}} = \frac{\text{Rs. } 200,000}{7,606} = \text{Rs. } 26,295$$

- 6.10 You want to take a world tour which costs Rs. 1,000,000 – the cost is expected to remain unchanged in nominal terms. You are willing to save annually Rs. 80,000 to fulfill your desire. How long will you have to wait if your savings earn a return of 14 percent per annum ?

Solution The future value of an annuity of Rs. 80,000 that earns 14 percent is Equated to Rs. 1,000,000.

$$80,000 \times \text{FVIFA}_{n=?, 14\%} = 1,000,000$$

$$80,000 \left(\frac{1.14^n - 1}{0.14} \right) = 1,000,000$$

$$1.14^n - 1 = \frac{1,000,000}{80,000} \times 0.14 = 1.75$$

$$1.14^n = 1.75 + 1 = 2.75$$

$$n \log 1.14 = \log 2.75$$

$$n \times .0569 = 0.4393$$

$$n = 0.4393 / 0.0569 = 7.72 \text{ years}$$

You will have to wait for 7.72 years.

- 6.11 Shyam borrows Rs. 80,000 for a musical 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 installment A is obtained by solving the equation :

$$80,000 = A \times \text{PVIFA}_{n=12, r=1.25\%}$$

$$80,000 = A \times \frac{1 - \frac{1}{(1+r)^n}}{r}$$

$$80,000 = A \times \frac{1 - \frac{1}{(1.0125)^{12}}}{.0125}$$

$$= A \times 11.0786$$

$$\text{Hence } A = 80,000 / 11.0786 = \text{Rs. } 7221$$

The loan amortisation schedule is shown below:

Loan Amortisation Schedule

Month	Beginning Amount (1)	Monthly Installment (2)	Interest (3)	Principal Repayment (2) - (3) = (4)	Remaining Balance (1) - (4) = (5)
1	80,000	7221	1000	6221	73779
2	73,779	7221	922.2	6298.8	67480.2
3	67,480.2	7221	843.5	6377.5	61102.7
4	61102.7	7221	763.8	6457.2	54645.5
5	54645.5	7221	683.1	6537.9	48107.6
6	48107.6	7221	601.3	6619.7	41487.9
7	41487.9	7221	518.6	6702.4	34785.5
8	34785.5	7221	434.8	6786.2	27999.3
9	27999.3	7221	350.0	6871.0	21128.3
10	21128.3	7221	264.1	6956.9	14171.4
11	14171.4	7221	177.1	7043.9	7127.1
12	7127.1	7221	89.1	7131.9	- 4.8 ^a

^aRounding off error

PROBLEMS

- 6.1 Calculate the value 5 years hence of a deposit of Rs. 1,000 made today if the interest rate is (a) 8 percent, (b) 10 percent, (c) 12 percent, and (d) 15 percent.
- 6.2 If you deposit Rs. 5,000 today at 12 percent rate of interest in how many years (roughly) will this amount grow to Rs. 1,60,000 ? Work this problem using the *rule of 72*—do not use tables.
- 6.3 A finance company offers to give Rs. 8,000 after 12 years in return for Rs. 1,000 deposited today. Using the *rule of 72*, figure out the approximate interest offered.
- 6.4 You can save Rs. 2,000 a year for 5 years, and Rs. 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 percent?
- 6.5 Mr. Vinay plans to send his son for higher studies abroad after 10 years. He expects the cost of these studies to be Rs. 100,000. How much should he save annually to have a sum of Rs. 100,000 at the end of 10 years, if the interest rate is 12 percent ?
- 6.6 A finance company advertises that it will pay a lump sum of Rs. 10,000 at the end of 6 years to investors who deposit annually Rs. 1,000. What interest rate is implicit in this offer?
- 6.7 Someone promises to give you Rs. 5,000 after 10 years in exchange for Rs. 1,000 today. What interest rate is implicit in this offer?
- 6.8 Find the present value of Rs. 10,000 receivable after 8 years if the rate of discount is (i) 10 percent, (ii) 12 percent, and (iii) 15 percent.

- 6.9 What is the present value of a 5-year annuity of Rs. 2,000 at 10 percent ?
- 6.10 At the time of his retirement, Mr. Jingo is given a choice between two alternatives: (a) an annual pension of Rs. 10,000 as long as he lives, and (b) a lump sum amount of Rs. 50,000. If Mr. Jingo expects to live for 15 years and the interest rate is 15 percent, which option appears more attractive?
- 6.11 Mr. X deposits Rs. 100,000 in a bank which pays 10 percent interest. How much can he withdraw annually for a period of 30 years. Assume that at the end of 30 years the amount deposited will whittle down to zero.
- 6.12 What is the present value of an income stream which provides Rs. 1,000 at the end of year one, Rs. 2,500 at the end of year two, and Rs. 5,000 during each of the years 3 through 10, if the discount rate is 12 percent ?
- 6.13 What is the present value of an income stream which provides Rs. 2,000 a year for the first five years and Rs. 3,000 a year forever thereafter, if the discount rate is 10 percent ?
Hint: The present value for a perpetual annuity is derived by dividing the constant annual flow by the discount factor.
- 6.14 What amount must be deposited today in order to earn an annual income of Rs. 5,000 beginning from the end of 15 years from now ? The deposit earns 10 percent per year.
- 6.15 Suppose someone offers you the following financial contract. If you deposit Rs. 20,000 with him he promises to pay Rs. 4,000 annually for 10 years. What interest rate would you earn on this deposit?
- 6.16 What is the present value of the following cash flow streams?

<i>End of year</i>	<i>Stream A</i>	<i>Stream B</i>	<i>Stream C</i>
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 percent.

- 6.17 Suppose you deposit Rs. 10,000 with an investment company which pays 16 percent interest with quarterly compounding. How much will this deposit grow to in 5 years?
- 6.18 How much would a deposit of Rs. 5,000 at the end of 5 years be, if the interest rate is 12 percent and if the compounding is done quarterly ?
- 6.19 What is the difference between the effective rate of interest and stated rate of interest in the following cases:

Case A: Stated rate of interest is 12 percent and the frequency of compounding is six times a year.

Case B: Stated rate of interest is 24 percent and the frequency of compounding is four times a year.

Case C: Stated rate of interest is 24 percent and the frequency of compounding is twelve times a year.

- 6.20 If the interest rate is 12 percent how much investment is required now to yield an income of Rs. 12,000 per year from the beginning of the 10th year and continuing thereafter forever ?
- 6.21 You have a choice between Rs. 5,000 now and Rs. 20,000 after 10 years. Which would you choose? What does your preference indicate?
- 6.22 Mr. Raghu deposits Rs. 10,000 in a bank now. The interest rate is 10 percent and compounding is done semi-annually. What will the deposit grow to after 10 years? If the inflation rate is 8 percent per year, what will be the value of the deposit after 10 years in terms of the current rupee?
- 6.23 How much should be deposited at the beginning of each year for 10 years in order to provide a sum of Rs. 50,000 at the end of 10 years ?
- 6.24 A person requires Rs. 20,000 at the beginning of each year from 2005 to 2009. How much should he deposit at the end of each year from 1995 to 2000? The interest rate is 12 percent.
- 6.25 What is the present value of Rs. 2,000 receivable annually for 30 years? The first receipt occurs after 10 years and the discount rate is 10 percent.
- 6.26 After five years Mr. Ramesh will receive a pension of Rs. 600 per month for 15 years. How much can Mr. Ramesh borrow now at 12 percent interest so that the borrowed amount can be paid with 30 percent of the pension amount? The interest will be accumulated till the first pension amount becomes receivable.
- 6.27 Mr. Prakash buys a scooter with a bank loan of Rs. 6,000. An instalment of Rs. 300 is payable to the bank for each of 24 months towards the repayment of loan with interest. What interest rate does the bank charge?
- 6.28 South India Corporation has to retire Rs. 10 million of debentures each at the end of 8, 9, and 10 years from now. How much should the firm deposit in a sinking fund account annually for 5 years, in order to meet the debenture retirement need? The net interest rate earned is 8 percent.
- 6.29 Mr. Longman receives a provident fund amount of Rs. 1,00,000. He deposits it in a bank which pays 10 percent interest. If he withdraws annually Rs. 20,000, how long can he do so ?
- 6.30 Phoenix Company borrows Rs. 500,000 at an interest rate of 14 percent. The loan is to be repaid in 4 equal annual instalments payable at the end of each of the next 4 years. Prepare the loan amortisation schedule.
- 6.31 You want to borrow Rs. 1,500,000 to buy a flat. You approach a housing company which charges 13 percent interest. You can pay Rs. 200,000 per year toward loan amortisation. What should be the maturity period of the loan?

- 6.32 You are negotiating with the government the right to mine 100,000 tons of iron ore per year for 15 years. The current price per ton of iron is Rs. 3000 and it is expected to increase at the rate of 6 percent per year. What is the present value of the iron ore that you can mine if the discount rate is 16 percent?
- 6.33 As a winner of a competition, you can choose one of the following prizes:
- Rs. 500,000 now
 - Rs. 1,000,000 at the end of 6 years
 - Rs. 60,000 a year forever
 - Rs. 100,000 per year for 10 years
 - Rs. 35,000 next year and rising thereafter by 5 percent per year forever.
- If the interest rate is 10 percent, which prize has the highest present value.
- 6.34 Pipe India owns an oil pipeline which will generate Rs. 120 million of cash income in the coming year. It has a very long life with virtually negligible operating costs. The volume of oil shipped, however, will decline over time and, hence, cash flows will decrease by 3 percent per year. The discount rate is 12 percent.
- If the pipeline is used forever, what is the present value of its cash flows?
 - If the pipeline is scrapped after 25 years, what is the present value of its cash flows?
- 6.35 An oil well presently produces 50,000 barrels per year. It will last for 15 years more, but the production will fall by 5 percent per year. Oil prices are expected to increase by 3 percent per year. Presently the price of oil is \$50 per barrel. What is the present value of the well's production if the discount rate is 10 percent?
- 6.36 An oil well presently produces 80,000 barrels per year. It will last for 20 years more, but the production will fall by 6 percent per year. Oil prices are expected to increase by 4 percent per year. Currently the price of oil is \$60 per barrel. What is the present value of the well's production if the discount rate is 12 percent?
- 6.37 You are considering whether your savings will be enough to meet your retirement needs. You saved Rs. 100,000 last year and you expect your annual savings to increase by 8 percent per year for the next 20 years. If your savings can be invested at 9 percent, how much would you have at the end of the twentieth year?
- 6.38 A bank offers an interest rate of 8 percent on deposits made with it. If the compounding is done on a weekly basis, what is the effective interest rate?

MINI CASE

As an investment advisor, you have been approached by a client called Ramesh, who wants some help in investment related matters.

Ramesh is currently 45 years old and has Rs. 600,000 in the bank. He plans to work for 15 more years and retire at the age of 60. Ramesh's present salary is Rs. 400,000 per year. He expects his salary to increase at the rate of 12 percent per year until his retirement.

Ramesh has decided to invest his bank balance and future savings in a portfolio in which stocks and bonds would be equally weighted. For the sake of simplicity, assume that these proportions will be maintained by him throughout. He also believes that bonds would provide a return of 7 percent and stocks a return of 13 percent. You concur with his assessment.

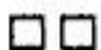
Once Ramesh retires at the age of 60 he would like to withdraw Rs. 500,000 per year from his investments for the following 15 years as he expects to live upto the age of 75 years. He also wants to bequeath Rs. 1,000,000 to his children at the end of his life. How much money would he need 15 years from now?

How much should Ramesh save each year for the next 15 years to be able to meet his investment objectives spelt out above? Assume that the savings will occur at the end of each year.

Suppose Ramesh wants to donate Rs. 200,000 each year in the last three years of his life to a charitable cause. Each donation would be made at the beginning of the year. How much money would he need when he reaches the age of 60 to meet this specific need?

Ramesh recently attended a seminar on human capital where the speaker talked about a person's human capital as the present value of his life time earnings. Ramesh is curious to find out the present value of his lifetime salary. For the sake of simplicity assume that his present salary of Rs. 400,000 will be paid exactly one year from now, and his salary will be paid in annual installments. What is the present value of his life time salary, if the discount rate is 8 percent? Remember that Ramesh expects his salary to increase at the rate of 12 percent per year until his retirement.

In answering the above questions, ignore the tax factor.



Valuation of Bonds and Stocks

In Chapter 6 we discussed the basic methods used to value future cash flows. In this chapter we will apply those methods for valuing bonds and stocks. In addition, we will introduce some of the terminology used in these areas and describe how the financial press reports the prices of these assets.

We assume that the appropriate discount rate is known. The question of how risk determines the appropriate discount rate is very important and we will discuss the issue in the following chapter. For now, our focus will be on what the relevant cash flows of financial assets are and how to value them, given an appropriate discount rate.

The objective of financial management is to maximise the value of the firm. Hence managers must know how stocks and bonds are valued. Knowing how to value securities (bonds and stocks, in the main) is as important for investors as it is for managers. Current and prospective investors must understand how to value bonds and stocks. Such knowledge is helpful to them in deciding whether they should buy or hold or sell securities at the prices prevailing in the market.

This chapter discusses the basic discounted cash flow valuation model and its application to bonds and stocks. It is divided into nine sections as follows:

- Distinction among valuation concepts
- Bond valuation
- Bond yields
- Bond market
- Preferred stock valuation
- Equity valuation: dividend discount model
- Equity valuation: P/E ratio approach
- E/P ratio, expected return and growth
- Stock market

7.1 ■ DISTINCTION AMONG VALUATION CONCEPTS

The term value is used in different senses. Hence, let us briefly review the differences that exist among the major concepts of value.

Liquidation Value versus Going Concern Value The *liquidation value* is the amount that can be realised when an asset or a group of assets representing a part or even the whole of a firm is sold separately from the operating organisation to which it belongs. In contrast, the *going concern value* represents the amount that can be realised if the firm is sold as a continuing operating entity.

In general, security valuation models assume a going concern, an operating business entity that generates cash flows to its security holders. When the going concern assumption is not appropriate as in the case of an impending bankruptcy, liquidation value of assets is more relevant in determining the worth of the firm's financial securities.

Book Value versus Market Value The *book value* of an asset is the accounting value of the asset, which is simply the historical cost of the asset less accumulated depreciation or amortisation as the case may be. The book value of a firm's equity is equal to the book value of its assets minus the book value of its liabilities. Because book value reflects a historical accounting value it may diverge significantly from market value.

The *market value* of an asset is simply the market price at which the asset trades in the market place. Often the market value is greater than the book value.

Market Value versus Intrinsic Value As the nomenclature suggests, the market value of a security is the price at which the security trades in the financial market.

The *intrinsic value* of a security is the present value of the cash flow stream expected from the security, discounted at a rate of return appropriate for the risk associated with the security. Put differently, intrinsic value is economic value. If the market is reasonably efficient, the market price of the security should hover around its intrinsic value. The focus of this chapter is on establishing a security's intrinsic value.

7.2 BOND VALUATION

A bond represents a contract under which a borrower promises to pay interest and principal on specific dates to the holders of the bond.

Bonds are issued by a variety of organisations. The principal issuers of bonds in India are the central government, state governments, public sector undertakings, and private sector companies.

Bonds issued by the central government are called *Treasury bonds*. These are bonds which typically have maturities ranging from 3 to 20 years. These bonds generally pay interest semi-annually.

State government bonds are issued by the state governments. These bonds also have maturities that generally range from 3 to 20 years and pay interest semi-annually.

Bonds issued by companies are classified into two types: PSU (public sector undertakings) bonds and private sector bonds. *PSU bonds* are bonds issued by companies in which the central or state governments have an equity stake in excess of 50 percent. Some of these bonds enjoy a tax-free status whereas others are taxable.

Private sector bonds are bonds issued by private sector companies. Bonds issued by companies, PSU bonds as well as private sector bonds, generally have maturity ranging from 1 year to 15 years and pay interest semi-annually.

Terminology 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 Rs. 100. Sometimes it is Rs. 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 \times coupon rate. Most bonds pay interest semi-annually. For example, a government security which has a par value of Rs. 1,000 and a coupon rate of 11 percent pays an interest of Rs. 55 every six months.

Maturity Period Typically bonds have a maturity period of 1–15 years; sometimes they have longer maturity. At the time of maturity the par (face) value plus perhaps a nominal premium is payable to the bondholder.

Valuation Model The value of a bond—or any asset, real or financial—is equal to the present value of the cash flows expected from it. Hence determining the value of a bonds requires:

- An estimate of expected cash flows
- An estimate of the required return

To simplify our analysis of bond valuation we will make the following assumptions:

- The coupon interest rate is fixed for the term of the bond.
- The coupon payments are made annually and the next coupon payment is receivable exactly a year from now.
- The bond will be redeemed at par on maturity.

Given these assumptions, the cash flow for a non-callable bond (a bond that cannot be prematurely retired) comprises of an annuity of a fixed coupon interest payable annually and the principal amount payable at maturity. Hence the value of the bond is:

$$P = \sum_{t=1}^n \frac{C}{(1+r)^t} + \frac{M}{(1+r)^n} \quad (7.1)$$

where P is the value (in rupees), n is the number of years to maturity, C is the annual coupon payment (in rupees), r is the periodic required return, M is the maturity value, and t is the time when the payment is received.

Since the stream of coupon payments is an ordinary annuity, we can apply the formula for the present value of an ordinary annuity. Hence the bond value is given by the formula:

$$P = C \times PVIFA_{r,n} + M \times PVIF_{r,n} \quad (7.1a)$$

To illustrate how to compute the price of a bond, consider a 10-year, 12 percent coupon bond with a par value of 1,000. Let us assume that the required yield on this bond is 13 percent. The cash flows for this bond are as follows:

- 10 annual coupon payments of Rs. 120
- Rs.1000 principal repayment 10 years from now

The value of the bond is:

$$\begin{aligned} P &= 120 \times PVIFA_{13\%, 10 \text{ yrs}} + 1,000 \times PVIF_{13\%, 10 \text{ yrs}} \\ &= 120 \times 5.426 + 1,000 \times 0.295 \\ &= 651.1 + 295 = \text{Rs. 946.1} \end{aligned}$$

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, C , 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 becomes:

$$\begin{aligned} P &= \sum_{t=1}^{2n} \frac{C/2}{(1+r/2)^t} + \frac{M}{(1+r/2)^{2n}} \\ &= C/2 (PVIFA_{r/2, 2n}) + M(PVIF_{r/2, 2n}) \end{aligned} \quad (7.2)$$

where P is the value of the bond, $C/2$ is the semi-annual interest payment, $r/2$ is the discount rate applicable to a half-year period, M is the maturity value, and $2n$ is the maturity period expressed in terms of half-yearly periods.

As an illustration, consider an 8 year, 12 percent coupon bond with a par value of Rs. 100 on which interest is payable semi-annually. The required return on this bond is 14 percent.

Applying Eq. (7.2), the value of the bond is :

$$\begin{aligned} P &= \sum_{t=1}^{16} \frac{6}{(1.07)^t} + \frac{100}{(1.07)^{16}} \\ &= 6(PVIFA_{7\%, 16}) + 100(PVIF_{7\%, 16}) \\ &= \text{Rs. } 6(9.447) + \text{Rs. } 100(0.339) = \text{Rs. } 90.6 \end{aligned}$$

Let us recalculate the above using the Excel financial function PRICE (settlement, maturity, rate, yield, redemption, frequency, basis), as follows:

	A	B	C
1	Settlement	1/1/2006	This is the date of purchase. If not certain, fill in any date.
2	Maturity	12/30/2013	The formula in this case is = B1 + 365*8, as the maturity period is 8 years.
3	Rate	12%	The annual coupon rate
4	Yield	14%	The required return per annum
5	Redemption	100	Fill in the redemption value as a percentage of the par value
6	Frequency	2	This represents the number of times interest is paid in a year
7	Basis	3	3 represents the day count convention: actual no. of days 365 in interest calculation
8	Price	90.55	To get the result in B8, use the function = PRICE(B1,B2,B3,B4,B5,B6,B7).
9	Bond price is obtained per Rs. 100 of the face value of the bond. Thus, had the redemption value been Rs. 1000 the bond price would be Rs. $90.55 \times 10 = \text{Rs. } 905.5$		

Relationship between Coupon Rate, Required Yield, and Price A basic property of a bond is that its price varies inversely with yield. The reason is simple. As the required yield decreases, the present value of the cash flow increases; hence the price increases. Conversely, when the required yield increases, the present value of the cash flow decreases.

The price-yield relationship may be illustrated with an example. Consider a bond carrying a coupon rate of 14 percent issued 3 years ago for Rs. 1000 (its par value) by Signal Corporation. The original maturity of the bond was 10 years, so its residual maturity now is 7 years. The interest rate has fallen in the last 3 years and investors now expect a return of 10 percent from this bond. The price of this bond now would be

$$P_0 = \sum_{t=1}^7 \frac{140}{(1.10)^t} + \frac{1000}{(1.10)^7} = \text{Rs. } 1194.5$$

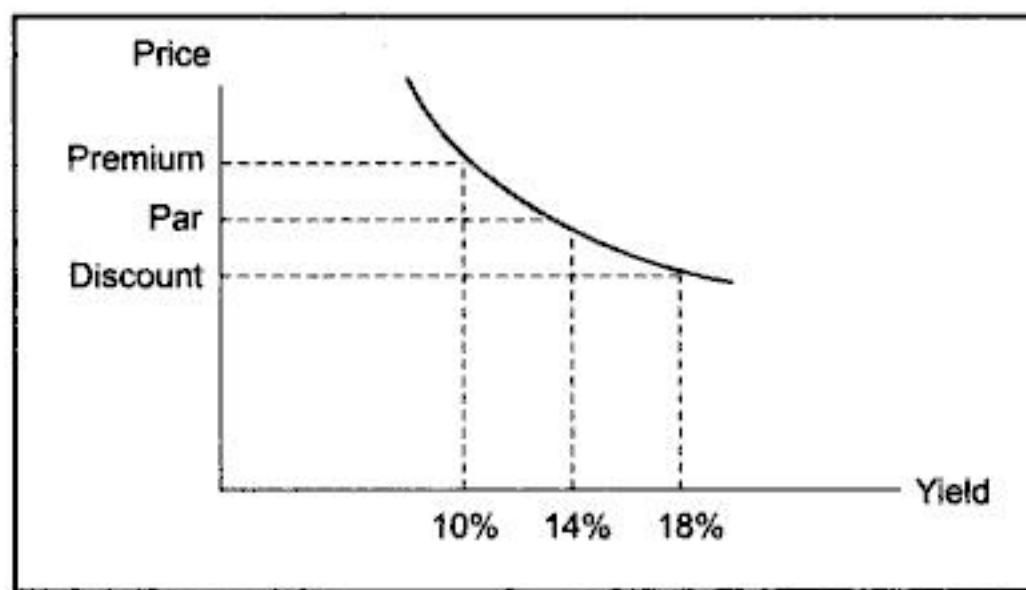
The arithmetic of the bond price increase is clear. What is the logic behind it? The fact that the required return on such a bond has fallen to 10 percent means that if you had Rs. 1,000 to invest, you can buy new bonds like Signal's except that these new bonds would pay Rs. 100, rather than Rs. 140, by way of interest. Naturally, as an investor you would prefer Rs. 140 to Rs. 100, so you would be willing to pay more than Rs. 1,000 for a Signal bond to enjoy its higher coupons. All investors would behave similarly and consequently the bond of Signal would be bid up in price to Rs. 1194.5 At that price it would provide a return of 10 percent, the rate the new bonds offer.

Now let us look at what happens when the interest rate rises after the bond has been issued. Assume that because of a rise in interest rates, investors now expect a return of 18 percent from the Signal bond. The price of the bond would be:

$$P_0 = \sum_{t=1}^7 \frac{140}{(1.18)^t} + \frac{1000}{(1.10)^7} = \text{Rs. } 848.5$$

The graph of the price-yield relationship for the bond has a convex shape as shown in Exhibit 7.1.

Exhibit 7.1 Price – Yield Relationship



To sum up, the relationship between the coupon rate, the required yield, and the price is as follows:

Coupon rate > Required yield \longleftrightarrow Price > Par (Premium bond)

Coupon rate = Required yield \longleftrightarrow Price = Par

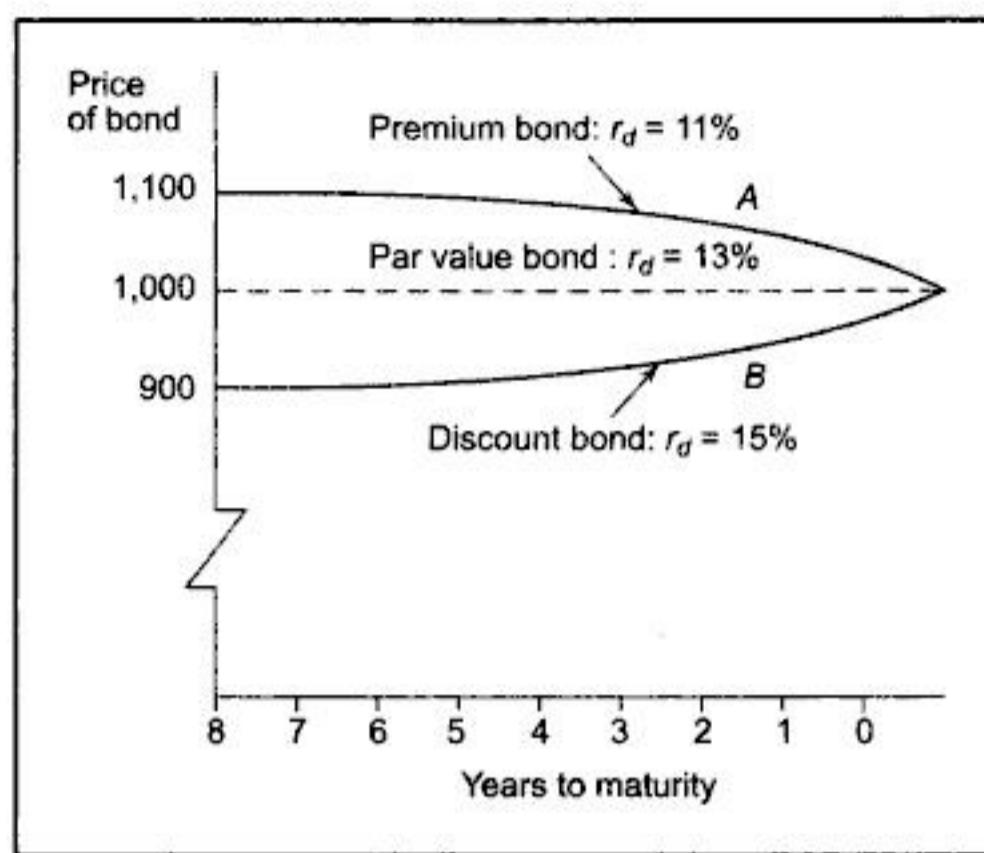
Coupon rate < Required yield \longleftrightarrow Price < Par (Discount bond)

Relationship between Bond Price and Time Since the price of a bond must equal its par value at maturity (assuming that there is no risk of default), bond prices change with time. For example, a bond that is redeemable for Rs. 1,000 (which is its par value) after 5 years when it matures, will have a price of Rs. 1,000 at maturity, no matter what the current price is. If its current price is, say, Rs. 1,100, it is said to be a premium bond. If the required yield does change between now and the maturity date, the premium will decline over time as shown by curve A in Exhibit 7.2. On the other hand, if the bond has a current price of say Rs. 900, it is said to be a discount bond. The discount too will disappear over time as shown by curve B in Exhibit 7.2. Only when the current price is equal to par value—in such a case the bond is said to be a par bond—there is no change in price as time passes, assuming that the required yield does not change between now and the maturity date. This is shown by the dashed line in Exhibit 7.2.

7.3 BOND YIELDS

In the previous section we learned how to determine the price of a bond and discussed how price and yield were related. We now discuss various yield measures.

The commonly employed yield measures are: current yield, yield to maturity, and yield to call. Let us examine how these yield measures are calculated.

Exhibit 7.2 Price Changes with Time

Current Yield The current yield relates the annual coupon interest to the market price. It is expressed as:

$$\text{Current yield} = \frac{\text{Annual interest}}{\text{Price}}$$

For example, the current yield of a 10 year, 12 percent coupon bond with a par value of Rs. 1000 and selling for Rs. 950 is 12.63 percent.

$$\text{Current yield} = \frac{120}{950} = 0.1263 \text{ or } 12.63 \text{ percent}$$

The current yield calculation reflects only the coupon interest rate. It does not consider the capital gain (or loss) that an investor will realise if the bond is purchased at a discount (or premium) and held till maturity. It also ignores the time value of money. Hence it is an incomplete and simplistic measure of yield.

Yield to Maturity The yield to maturity (YTM) of a bond is the interest rate that makes the present value of the cash flows receivable from owning the bond equal to the price of the bond. Mathematically, it is the interest rate (r) which satisfies the equation:

$$P = \frac{C}{(1+r)} + \frac{C}{(1+r)^2} + \cdots + \frac{M}{(1+r)^n} + \frac{M}{(1+r)^n} \quad (7.3)$$

where P is the price of the bond, C is the annual interest (in rupees), M is the maturity value (in rupees), and n is the number of years left to maturity.

The computation of YTM requires a trial and error procedure. To illustrate this, consider a Rs. 1,000 par value bond, carrying a coupon rate of 9 percent, maturing after 8 years. The



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To illustrate the use of this formula, let us consider the bond discussed above. The approximate YTM of the bond works out to :

$$YTM = \frac{90 + (1000 - 800)/8}{0.4 \times 1000 + 0.6 \times 800} = 13.1\%$$

Thus, we find that this formula gives a value which is very close to the true value (13.2 percent). Hence it is very useful.

The YTM calculation considers the current coupon income as well as the capital gain or loss the investor will realise by holding the bond to maturity. In addition, it takes into account the timing of the cash flows.

Yield to Call Some bonds carry a call feature that entitles the issuer to call (buy back) the bond prior to the stated maturity date in accordance with a call schedule (which specifies a call price for each call date). For such bonds, it is a practice to calculate the yield to call (YTC) as well as the YTM.

The procedure for calculating the YTC is the same as for the YTM. Mathematically, the YTC is the value of r in the following equation:

$$P = \sum_{t=1}^{n^*} \frac{C}{(1+r)^t} + \frac{M^*}{(1+r)^{n^*}} \quad (7.5)$$

where M^* is the call price (in rupees) and n^* is the number of years until the assumed call date.

7.4 ≡ BOND MARKET

Bonds are bought and sold in large quantities. The Indian bond market has grown rapidly since the mid-1990s. With a daily turnover of about Rs. 5,000 crore in mid-2003, it is one of the largest in Asia. The growth in the bond market has been stimulated by a host of reforms such as the increased functional autonomy of the RBI, improved institutional infrastructure, technology-related initiatives, and consolidation and creation of benchmark securities.

Most trading in bonds takes place over the counter. This means that the transactions are privately negotiated and they don't take place through the process of matching of orders on an organised exchange. This is a characteristic of bond markets all over the world, not just in India. Because the bond market is largely over the counter, it lacks transparency. A financial market is transparent if you can easily observe its prices and volumes.

The National Stock Exchange has a Wholesale Debt Market (WDM) segment. The WDM segment is a market for high value transactions in government securities, PSU bonds, commercial papers, and other debt instruments. The quotations of this segment mostly reflect over the counter transactions that are privately negotiated over the phone or computer and registered with the exchange for reporting purposes.

An illustrative quotation from the WDM segment of the National Stock Exchange is given below

Security Type	Issue Name	No. of Trades	Trade Value (Rs. Cr)	Low Rate	High Rate	Last Rate	Weighted Yield
CG 200	11.55%	12	70	101.33	101.33	101.33	9.4910



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$$P_n = \frac{D_{n+1}}{(1+r)} + \frac{D_{n+2}}{(1+r)^2} + \dots + \frac{D_\infty}{(1+r)^{\infty-n}} \quad (7.13)$$

Substituting this value of P_n in Eq. (7.12) we get :

$$\begin{aligned} P_0 &= \frac{D_1}{(1+r)^1} + \frac{D_2}{(1+r)^2} + \dots + \frac{D_n}{(1+r)^n} \\ &\quad + \frac{1}{(1+r)^n} \left(\frac{D_{n+1}}{(1+r)} + \frac{D_{n+2}}{(1+r)^2} + \dots + \frac{D_\infty}{(1+r)^{\infty-n}} \right) \\ &= \frac{D_1}{(1+r)} + \frac{D_2}{(1+r)^2} + \dots + \frac{D_n}{(1+r)^n} + \frac{D_{n+1}}{(1+r)^{n+1}} + \dots + \frac{D_\infty}{(1+r)^\infty} \\ &= \sum_{t=1}^{\infty} \frac{D_t}{(1+r)^t} \end{aligned} \quad (7.14)$$

This is the same as Eq. (7.11) which may be regarded as a generalised multi-period valuation formula. Eq. (7.11) is general enough to permit any dividend pattern: constant, rising, declining, or randomly fluctuating. For practical applications it is helpful to make simplifying assumptions about the pattern of dividend growth. The more commonly used assumptions are as follows:

- The dividend per share remains constant forever, implying that the growth rate is nil (the zero growth model).
- The dividend per share grows at a constant rate per year forever (the constant growth model).
- The dividend per share grows at a constant rate for a finite period, followed by a constant normal rate of growth forever thereafter (the two-stage model).
- The dividend per share, currently growing at an above-normal rate, experiences a gradually declining rate of growth for a while. Thereafter, it grows at a constant normal rate (the H model).

Zero Growth Model If we assume that the dividend per share remains constant year after year at a value of D , Eq. (7.11) becomes :

$$P_0 = \frac{D}{(1+r)} + \frac{D}{(1+r)^2} + \dots + \frac{D}{(1+r)} + \dots \infty \quad (7.15)$$

Equation (7.15), on simplification, becomes:

$$P_0 = \frac{D}{r} \quad (7.16)$$

Remember that this is a straight forward application of the present value of perpetuity formula discussed in the previous chapter.



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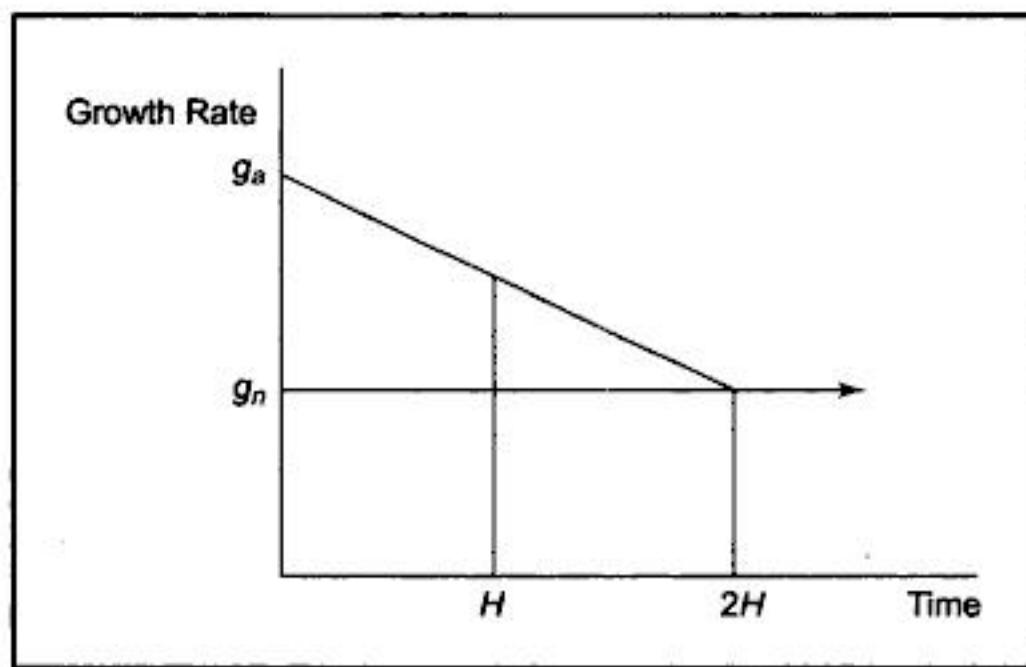
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H Model The H model of equity valuation is based on the following assumptions:

- While the current dividend growth rate, g_a , is greater than g_n , the normal long-run growth rate, the growth rate declines linearly for $2H$ years.
- After $2H$ years the growth rate becomes g_n .
- At H years the growth rate is exactly halfway between g_a and g_n .

The graphical representation of the dividend growth rate pattern for the H model is shown in Exhibit 7.4.

Exhibit 7.4 Dividend Growth Rate Pattern for H Model



While the derivation of the H model is rather complex, the valuation equation for the H model is quite simple:

$$P_0 = \frac{D_0[(1 + g_n) + H(g_a - g_n)]}{r - g_n} \quad (7.25)$$

where P_0 is the intrinsic value of the share, D_0 is the current dividend per share, r is the rate of return expected by investors, g_n is the normal long-run growth rate, g_a is the current growth rate, and H is one-half of the period during which g_a will level off to g_n .

Equation (7.25) may be re-written as:

$$P_0 = \frac{D_0(1 + g_n)}{r - g_n} + \frac{D_0H(g_a - g_n)}{r - g_n} \quad (7.26)$$

Expressed this way, the H model may be interpreted in a simple, intuitive manner. The first term on the right hand side of Eq. (7.26)

$$\frac{D_0(1 + g_n)}{r - g_n}$$

represents the value based on the normal growth rate, whereas the second term

$$\frac{D_0H(g_a - g_n)}{r - g_n}$$

reflects the premium due to abnormal growth rate.



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Consider the case of Maturity Limited, a firm that does not grow at all. It pays all its earnings as dividends and does not plough back anything. Put differently, it pays a constant stream of dividends and hence its stock is like a perpetual bond. Hence the expected return on its stock is its dividend per share divided by the share price (i.e. the dividend yield) which is also the same as its earnings per share divided by the share price (i.e. the E/P ratio). If the earnings per share as well as the dividend per share is Rs. 15 and the stock price is Rs. 100, we have:

$$\text{Expected return} = \text{Dividend yield} = \text{Earnings - price ratio}$$

$$\begin{aligned} &= \frac{D_1}{P_0} = \frac{E_1}{P_0} \\ &= 15/100 \text{ or } 15 \text{ percent} \end{aligned}$$

The price is equal to:

$$P_0 = \frac{D_1}{r} = \frac{E_1}{r} \quad (7.32)$$

where r is the expected return.

Even for a growing firm the expected return can equal the E/P ratio if retained earnings earn a return equal to the market capitalisation ratio. Suppose Maturity Limited identifies a proposal to invest Rs. 15 a share next year which is expected to earn a return of 15 percent, just equal to the opportunity cost of capital. To undertake this investment, Maturity Limited decides to skip the dividend for year 1. The investment of Rs. 15 a share will generate an additional earnings of Rs. 2.25 (Rs. 15 times 15 percent) per share in future thereby raising the dividend per share to Rs. 17.25 per share from year 2 onwards.

The net present value (NPV) per share for this proposal will be:

$$-15 + \frac{2.25}{0.15} = 0$$

Since the prospective return on this investment is equal to the opportunity cost of capital, it makes no contribution to the value of the firm and has no effect on the share price. The reduction in value caused by a zero dividend in year 1 is offset by an increase in value due to higher dividends in subsequent years. Hence, the market capitalisation rate equals the E/P ratio:

$$r = \frac{E_1}{P_0} = \frac{15}{100} = 0.15$$

Exhibit 7.6 presents our example for varying assumptions about the profitability of the proposed investment. Note that the earnings-price ratio (E_1/P_0) is equal to the market capitalisation rate (r) only when the proposed investment has a zero NPV. This is a very important point because managers often confuse E/P ratio with the market capitalisation rate and tend to make poor financial decisions.



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The important abbreviations used in stock exchange quotations are as follows:

- cn — convertible
- xd — ex (excluding) dividend
- cd — cum (with) dividend
- xr — ex (excluding) right
- sl — small lot

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 measured by indices representing the entire market or important segments thereof.

The two most popular stock market indices in India are Sensex and Nifty. A brief discussion of them follows:

- **Bombay Stock Exchange Sensitive Index** 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. The index of any trading day reflects the aggregate market value of the floating stock of the sample of 30 shares on that day in relation to the average aggregate market value of the floating stock of these shares in the base year, 1978–79. The base value of this index is 100.
- **S&P CNX Nifty** Arguably the most rigorously constructed stock market index in India, the *Nifty* reflects the price movement of 50 shares selected on the basis of market capitalisation and liquidity (impact cost). The index of any trading day reflects the aggregate market value of the sample of 50 shares on that day in relation to the aggregate market value of those shares on November 3, 1995. The base value of this index is 1000.

SUMMARY

- The term value is used in different senses. **Liquidation value, going concern value, book value, market value, and intrinsic value** are the most commonly used concepts of value.
- The **intrinsic value** of any asset, real or financial, is equal to the present value of the cash flows expected from it. Hence, determining the value of an asset requires an estimate of expected cash flows and an estimate of the required return.
- The value of a bond is:

$$P = \sum_{t=1}^n \frac{C}{(1+r)^t} + \frac{M}{(1+r)^n}$$

- A basic property of a bond is that its price varies inversely with yield.
- The relationship between **coupon rate, required yield, and bond price** is as follows:

Coupon rate < Required yield \leftrightarrow Price < Par (Discount bond)

Coupon rate = Required yield \leftrightarrow Price = Par

Coupon rate > Required yield \leftrightarrow Price > Par (Premium bond)



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Solution According to the constant growth model

$$P_0 = \frac{D_1}{r - g}$$

This means

$$g = r - D_1/P_0$$

Hence, the expected growth rate (g) for Rax Limited is:

$$g = 0.15 - \frac{2.00}{30.00} = .083 \text{ or } 8.3 \text{ percent}$$

- 7.5 Vardhman Limited's earnings and dividends have been growing at a rate of 18 percent per annum. This growth rate is expected to continue for 4 years. After that the growth rate will fall to 12 percent for the next 4 years. Thereafter, the growth rate is expected to be 6 percent forever. If the last dividend per share was Rs. 2.00 and the investors' required rate of return on Vardhman's equity is 15 percent, 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

$$\begin{aligned} D_1 &= 2.00 (1.18) = 2.36 \\ D_2 &= 2.00 (1.18)^2 = 2.78 \\ D_3 &= 2.00 (1.18)^3 = 3.29 \\ D_4 &= 2.00 (1.18)^4 = 3.88 \\ D_5 &= 2.00 (1.18)^4 (1.12) = 4.34 \\ D_6 &= 2.00 (1.18)^4 (1.12)^2 = 4.86 \\ D_7 &= 2.00 (1.18)^4 (1.12)^3 = 5.45 \\ D_8 &= 2.00 (1.18)^4 (1.12)^4 = 6.10 \end{aligned}$$

The present value of this dividend stream is:

$$\begin{aligned} &2.36 (\text{PVIF}_{15\%}, 1 \text{ yrs}) + 2.78 (\text{PVIF}_{15\%}, 2 \text{ yrs}) \\ &+ 3.29 (\text{PVIF}_{15\%}, 3 \text{ yrs}) + 3.88 (\text{PVIF}_{15\%}, 4 \text{ yrs}) \\ &+ 4.34 (\text{PVIF}_{15\%}, 5 \text{ yrs}) + 4.86 (\text{PVIF}_{15\%}, 6 \text{ yrs}) \\ &+ 5.45 (\text{PVIF}_{15\%}, 7 \text{ yrs}) + 6.10 (\text{PVIF}_{15\%}, 8 \text{ yrs}) \\ &= 2.36 (0.870) + 2.78 (0.756) + 3.29 (0.658) \\ &+ 3.88 (0.572) + 4.34 (0.497) + 4.86 (0.432) \\ &+ 5.45 (0.376) + 6.10 (0.327) \\ &= 2.05 + 2.10 + 2.16 + 2.22 + 2.16 + 2.10 + 2.05 + 1.99 = \text{Rs. } 16.83 \end{aligned}$$

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 :



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- f. How is a constant growth stock valued?
- g. Magnum chemicals is a constant growth company which paid a dividend of Rs. 6.00 per share yesterday (D_0 = Rs. 6.00) and the dividend is expected to grow at a rate of 12 percent per year forever. If investors require a rate of return of 15 percent (i) what is the expected value of the stock a year from now? (ii) what is the expected dividend yield and capital gains yield in the first year?
- h. Zenith Electronics paid a dividend of Rs. 10.00 per share yesterday (D_0 = Rs. 10.00). Zenith Electronics is expected to grow at a supernormal growth rate of 25 percent for the next 4 years, before returning to a constant growth rate of 10 percent thereafter. What will be the present value of the stock, if investors require a return of 16 percent?
- i. The earnings and dividends of Ravi Pharma are expected to grow at a rate of 20 percent for the next 3 years. Thereafter, the growth rate is expected to decline linearly for the following 5 years before settling down at 10 percent per year forever. Ravi Pharma paid a dividend of Rs. 8.00 per share yesterday (D_0 = Rs. 8.00). If investors require a return of 14 percent from the equity of Ravi Pharma, what is the intrinsic value per share?



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where $E(R)$ is the expected return, R_i is the return for the i th possible outcome, p_i is the probability associated with R_i , and n is the number of possible outcomes.

From Eq. (8.1), 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:

$$E(R_b) = (0.30)(16\%) + (0.5)(11\%) + (0.2)(6\%) = 11.5\%$$

Similarly, the expected rate of return on Oriental Shipping stock is:

$$E(R_o) = (0.30)(40\%) + (0.50)(10\%) + (0.20)(-20\%) = 13.0\%$$

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,

$$\sigma^2 = \sum p_i (R_i - E(R))^2 \quad (8.2)$$

where σ^2 is the variance, R_i is the return for the i th possible outcome, p_i is the probability associated with the i th possible outcome, and $E(R)$ is the 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.

$$\sigma = (\sigma^2)^{1/2} \quad (8.3)$$

where σ is the standard deviation.

As an illustration, the standard deviation of returns on Bharat Foods stock and Oriental Shipping stock are calculated in Exhibit 8.2.

Features of Standard Deviation Looking at the calculation of standard deviation, we find that it has the following features:

- The differences between the various possible values and the expected value are squared. This means that values which are far away from the expected value have a much more effect on standard deviation than values which are close to the expected value.
- The squared differences are multiplied by the probabilities associated with the respective values. This means that the smaller the probability that a particular value will occur, the lesser its effect on standard deviation.
- The standard deviation is obtained as the square root of the sum of squared differences (multiplied by their probabilities). This means that the standard deviation and expected value are measured in the same units and hence the two can be directly compared.



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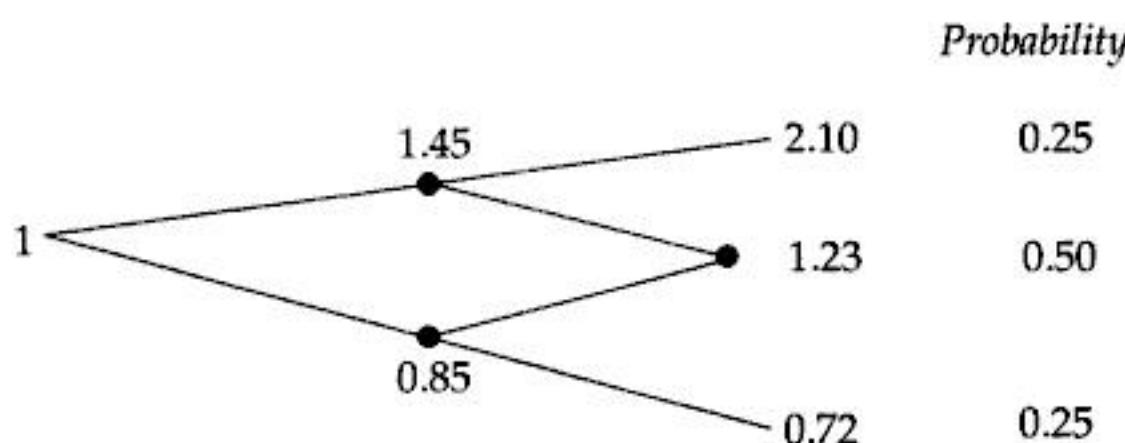


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What is the rationale for the arithmetic mean? Why should the arithmetic mean be preferred to the geometric mean?

To answer these questions, let us consider an example. Suppose the equity share of Modern Pharma has an expected return of 15 percent in each year with a standard deviation of 20 percent. Assume that there are two equally possible outcomes each year, +45 percent and -15 percent (that is, the mean plus or minus one standard deviation). The arithmetic mean of these returns is 15 percent, $(45-15)/2$, whereas the geometric mean of these returns is 11.1 percent, $[(1.45)(0.85)]^{1/2} - 1$.

An investment of one rupee in the equity share of Modern Pharma would grow over a two year period as follows:



Notice that the median (middle outcome) and mode (most common outcome) are given by the geometric mean (11.0 percent), which over a two-year period compounds to 23 percent ($1.11^2 = 1.23$). The expected value of all possible outcomes, however, is equal to:

$$(0.25 \times 2.10) + (0.50 \times 1.23) + (0.25 \times 0.72) = 1.32$$

Now 1.32 is equal to $(1.15)^2$. This means that the expected value of the terminal wealth is obtained by compounding up the arithmetic mean, not the geometric mean. Hence the arithmetic mean is the appropriate discount rate.

Put differently, the arithmetic mean is the appropriate mean because an investment that has uncertain returns will have a higher expected terminal value than an investment that earns its compound or geometric mean with certainty every year. In the above example, compounding at the rate of 11 percent for two years produces a terminal value of Rs. 1.23, for an investment of Re 1.00. But holding the uncertain investment which yields high returns (45 percent per year for two years in a row) or low returns (-15 percent per year for two years in a row), yields a higher expected terminal value, Rs. 1.32. This happens because the gains from higher-than-expected returns are greater than the losses from lower-than-expected returns. As Roger G. Ibbotson and Rex A. Sinquefield put it: "Therefore, in the investment markets, where returns are described by a probability distribution, the arithmetic mean is the measure that accounts for uncertainty, and is the appropriate one for estimating discount rates and the cost of capital."



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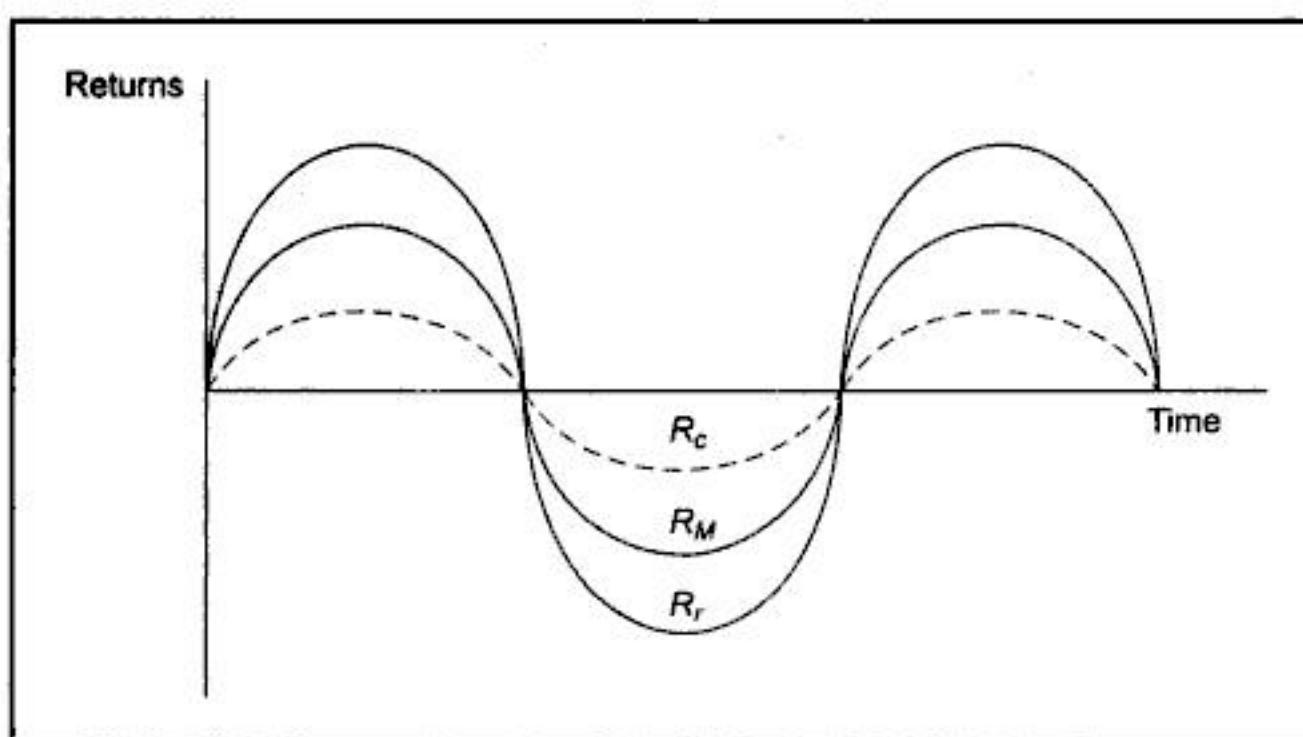
The *market risk* of a stock represents that portion of its risk which is attributable to economy-wide factors like the growth rate of GNP, the level of government spending, money supply, interest rate structure, and inflation rate. Since these factors affect all firms to a greater or lesser degree, 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.

8.3 MEASUREMENT OF MARKET RISK

If you want to figure out the contribution of an individual stock to the risk of a well-diversified portfolio, you have to look at its market risk, and not its risk if it is held in isolation.

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 8.8 which shows the returns on the market portfolio (R_M) over time, along with returns on two other securities—a risky security (whose return is denoted by (R_r)) and a conservative security (whose return is denoted by (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).

Exhibit 8.8 Behaviour of Returns Over Time



The sensitivity of a security to market movements is called beta (β). Though not perfect, beta represents a 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 percent, the return on the security with a beta of 1.5 is expected to increase by 15 percent (1.5×10 percent). On the other hand, a security which has a beta of, say, 0.8 fluctuates less than the market portfolio. If the return on the market portfolio is expected



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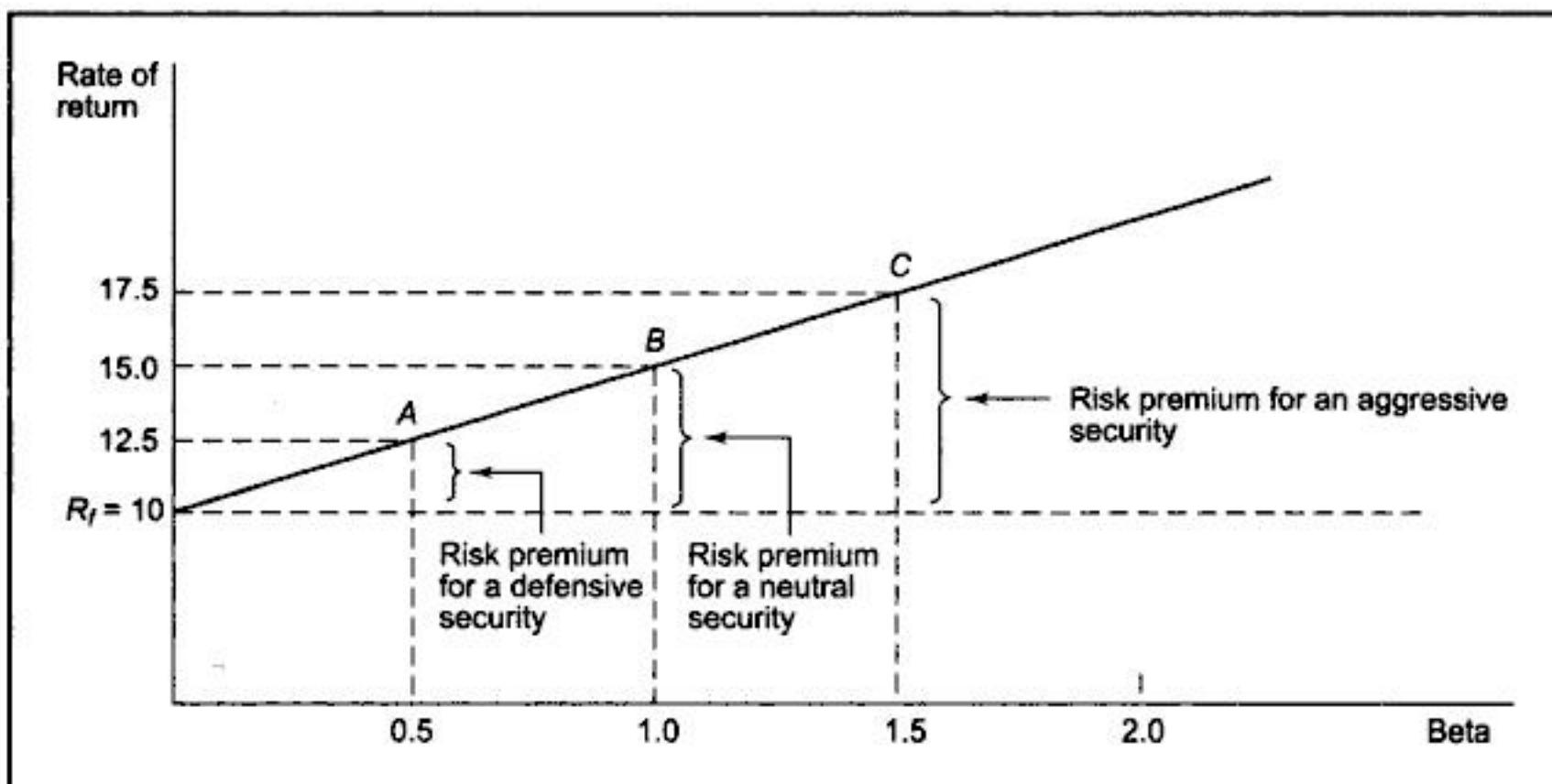
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If the real risk-free rate of return and/or the inflation rate changes, the intercept of the security market line changes. If the risk aversion of investors changes, the slope of the security market line changes. Exhibit 8.14 shows the change in the security market line when the inflation rate increases and Exhibit 8.15 shows the change in the security market line when the risk-aversion of investors decreases.

Exhibit 8.13 Security Market Line



Security Market Equilibrium

Suppose the required return on stock A is 15 percent, calculated as follows:

$$\begin{aligned} R_A &= R_f + \beta_A(R_M - R_f) \\ &= 10\% + 1.25(14\% - 10\%) = 15\% \end{aligned}$$

After assessing the prospects of stock A, investors conclude that its earnings, dividends, and price will continue to grow at the rate of 6 percent annum. The previous dividend per share, D_0 , was Rs. 1.70. The dividend per share expected a year hence is:

$$D_1 = \text{Rs. } 170(1.06) = 1.80$$

The market price per share happens to be Rs. 22. What would investors, in general, do? Investors would calculate the expected return from stock A as follows:

$$\begin{aligned} \text{Expected return} &= \text{Dividend yield} + \text{Growth rate} \\ &= 1.80/22 + 6\% \\ &= 8.2\% + 6\% = 14.2\% \end{aligned}$$

Finding that the expected return is less than the required rate, investors, in general, would like to sell the stock. However, as there would be no demand for the stock at Rs. 22 per share, existing owners will have to lower the price to such a level that it fetches a



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QUESTIONS

- How is the rate of return on an asset defined?
- What is standard deviation? What are its important features?
- Why is standard deviation employed commonly in finance as a measure of risk?
- Describe the key features of normal distribution.
- Explain how diversification influences risk.
- Distinguish between unique risk and market risk.
- Define the standard deviation of the return on a two-security portfolio.
- How is beta calculated?
- What is the relationship between risk and return as per CAPM?
- What is a defensive security, neutral security, and aggressive security?
- What is the effect of change in risk aversion on the security market line?
- "The increase in the risk-premium of all stocks, irrespective of their beta, is the same, when risk aversion increases". Comment.
- What are the investment implications of CAPM?

SOLVED PROBLEMS

- 8.1 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 Rs. 100 per share. You assess the rupee return (dividend plus price) of these stocks for the next year as follows :

Economic Condition

	<i>High growth</i>	<i>Low growth</i>	<i>Stagnation</i>	<i>Recession</i>
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:

- Rs. 1,000 in the equity stock of Box Limited
- Rs. 1,000 in the equity stock of Cox Limited
- Rs. 500 each in the equity stock of Box Limited and Cox Limited.

Solution

- (a) 10 equity shares of Box Limited can be bought for Rs. 1,000. The probability distribution of overall return, when 10 equity shares of Box Limited are purchased will be as follows :

<i>Economic condition</i>	<i>Overall return</i>	<i>Probability</i>
High growth	10(100) = Rs. 1,000	0.3
Low growth	10(110) = Rs. 1,100	0.4
Stagnation	10(120) = Rs. 1,200	0.2
Recession	10(140) = Rs. 1,400	0.1



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PROBLEMS

8.1 You are considering purchasing the equity stock of MVM Company. The current price per share is Rs. 10. You expect the dividend a year hence to be Re.1.00. You expect the price per share of MVM stock a year hence to have the following probability distribution.

Price a year hence	Rs. 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?

8.2 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 Rs. 50 per share. The rupee return (dividend plus price change) of these stocks for the next year would be as follows:

	<i>Economic condition</i>			
	<i>High growth</i>	<i>Low growth</i>	<i>Stagnation</i>	<i>Recession</i>
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:

- (a) Rs. 1,000 in the equity stock of Alpha;
- (b) Rs. 1,000 in the equity stock of Beta;
- (c) Rs. 500 in the equity stock of Alpha and Rs. 500 in the equity stock of Beta;
- (d) Rs. 700 in the equity stock of Alpha and Rs. 300 in the equity of Beta.

Which of the above four options would you choose? Why?

8.3 The returns on the equity stock of Auto Electricals Limited and the market portfolio over a 12 year period are given below:

<i>Year</i>	<i>Return on Auto Electricals Ltd. (%)</i>	<i>Return on Market Portfolio (%)</i>
1	15	12
2	-6	1
3	18	14
4	30	24
5	12	16
6	25	30
7	2	-3
8	20	24
9	18	15
10	24	22
11	8	12



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<i>State of nature</i>	<i>Probability</i>	<i>Return on security 1</i>	<i>Deviation of the return on security 1 from its mean</i>	<i>Return on security 2</i>	<i>Deviation of the return on security 2 from its mean</i>	<i>Product of the deviations times probability</i>
(1)	(2)	(3)	(4)	(5)	(6)	(2) × (4) × (6)
1	0.10	-10%	-26%	5%	-9%	23.4
2	0.30	15%	1%	12%	-2%	-0.6
3	0.30	18%	2%	19%	5%	3.0
4	0.20	22%	6%	15%	1%	1.2
5	0.10	27%	11%	12%	-2%	-2.2
						Sum = 26.0

Thus the covariance between the returns on the two securities is 26.0.

Coefficient of Correlation Covariance and correlation are conceptually analogous in the sense that both of them reflect the degree of comovement between two variables. Mathematically, they are related as follows:

$$\text{Cor}(R_i, R_j) \text{ or } \rho_{ij} = \frac{\text{Cov}(R_i, R_j)}{\sigma(R_i) \cdot \sigma(R_j)} \text{ or } \frac{\sigma_{ij}}{\sigma_i \cdot \sigma_j} \quad (9.4)$$

$$\sigma_{ij} = \rho_{ij} \cdot \sigma_i \cdot \sigma_j \quad (9.5)$$

where $\text{Cor}(R_i, R_j) = \rho_{ij}$ is the correlation coefficient between the returns on securities i and j , $\text{Cov}(R_i, R_j) = \sigma_{ij}$ is the covariance between the returns on securities i and j , and $\sigma(R_i)$, $\sigma(R_j) = \sigma_i$, σ_j are the standard deviations of the returns on securities i and j .

Thus the correlation coefficient is simply covariance divided by the product of standard deviations. The correlation coefficient can vary between -1.0 and +1.0. A value of -1.0 means perfect negative correlation or perfect comovement in the opposite direction; a value of 0 means no correlation or comovement whatsoever; a value of +1.0 means perfect correlation or perfect comovement in the same direction. Exhibit 9.1 portrays graphically various types of correlation relationships.

Calculation of Portfolio Risk

Now that we understand how to measure covariance and correlation, we will learn how to calculate portfolio risk. We will first look at the 2-security case and then generalise it to the n -security case.

Portfolio Risk: 2-Security Case The risk of a portfolio consisting of two securities is given by the following formula:

$$\sigma_p^2 = w_1^2 \sigma_1^2 + w_2^2 \sigma_2^2 + 2 w_1 w_2 \rho_{12} \sigma_1 \sigma_2 \quad (9.6)$$



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Thus, the task of portfolio selection can be separated into two steps.

- Identification of S , the optimal portfolio of risky securities.
- Choice of a combination of R_f and S depending on one's risk attitude.

This is the import of the celebrated *separation theorem*, first proposed by James Tobin.

9.3 ■ CAPITAL ASSET PRICING MODEL

Harry Markowitz developed an approach that helps an investor to achieve his optimal portfolio position. Hence, portfolio theory, in essence, has a normative character as it prescribes what a rational investor should do.

William Sharpe and others asked the follow-up question: If rational investors follow the Markowitzian prescription, what kind of relationship exists between risk and return? Essentially, the Capital Asset Pricing Model (CAPM) developed by them is an exercise in positive economics. It is concerned with two key questions:

- What is the relationship between risk and return for an efficient portfolio?
- What is the relationship between risk and return for an individual security?

The CAPM, in essence, predicts the relationship between the risk of an asset and its expected return. This relationship is very useful in two important ways. First, it produces a benchmark for evaluating various investments. For example, when we are analysing a security we are interested in knowing whether the expected return from it is in line with its fair return as per the CAPM. Second, it helps us to make an informed guess about the return that can be expected from an asset that has not yet been traded in the market. For example, how should a firm price its initial public offering of stock?

Although the empirical evidence on the CAPM is mixed, it is widely used because of the valuable insight it offers and its accuracy is deemed satisfactory for most practical applications. No wonder, the CAPM is a centerpiece of modern financial economics and William Sharpe, its principal originator, was awarded the Nobel Prize in Economics.

The CAPM is based on the following assumptions:

- Investors are risk averse.
- Security returns are normally distributed.
- The utility function of investors is quadratic.
- Investors have homogeneous expectations—they have identical subjective estimates of the means, variances, and covariances among returns.
- Investors can borrow and lend freely at a riskless rate of interest.
- The market is perfect: there are no taxes; there are no transactions costs; securities are completely divisible; the market is competitive.
- The quantity of risky securities in the market is given.

Looking at these assumptions, one may feel that the CAPM is unrealistic. However, the value of a model depends not on the realism of its assumptions, but on the validity of its conclusions. Extensive empirical analysis suggests that there is a lot of merit in the CAPM.



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In practice, researchers have tested the CAPM using *ex post data*, rather than *ex ante* data. They have examined the relationship between the security beta and realised return.

$$\bar{R}_i = \gamma_0 + \gamma_1 \beta_i + e_i \quad (9.15)$$

where \bar{R}_i is the realised return on security i , γ_0 is the intercept, β_i is the estimated beta of security i , and γ_1 is the slope coefficient.

If the CAPM holds:

- The relationship should be linear. This means that terms like β_i^2 , if substituted for β_i , should not yield better explanatory power.
- γ_0 , the intercept, should not be significantly different from the risk-free rate, R_f .
- γ_1 , the slope coefficient, should not be significantly different from $\overline{R_M - R_f}$.
- No other factors such as company size or total variance should affect R_i .
- The model should explain a significant portion of variation in returns among securities.

Numerous empirical studies have been conducted to test the CAPM. Without going into the details of the individual studies, let us note the following general conclusions that emerge from these studies.

- The relation appears to be linear.
- In general γ_0 is greater than the risk-free rate and γ_1 is less than $\overline{R_M - R_f}$. This means that the actual relationship between risk (as measured by beta) and return is flatter than what the CAPM says.
- In addition to beta, some other factors, such as standard deviation of returns, price – earnings multiple and company size, too have a bearing on return.
- Beta does not explain a very high percentage of the variance in return among securities.

While reviewing the empirical evidence, bear in mind two important problems. First, the studies use historical returns as proxies for expectations. This assumes that the expected returns will be the same as the realised returns. Second, the studies use a market index as a proxy for the market portfolio. Richard Roll has argued persuasively that since the 'true' market portfolio (which in principle must include all assets—financial, real, as well as human – and not just equity stocks), cannot be measured, the CAPM cannot be tested.

Notwithstanding the problems mentioned above, the CAPM is the most widely used risk return model. Its popularity may be attributed to the following factors:

- Some objective estimate of risk premium is better than a completely subjective estimate or no estimate.
- CAPM is a simple and intuitively appealing risk-return model. Its basic message that diversifiable risk does not matter is accepted by nearly every one.
- While there are plausible alternative risk measures, no consensus has emerged on what course to plot if beta is abandoned. As Brealey and Myers say: "So the capital asset pricing model survives not from a lack of competition but from a surfeit".

The situation perhaps may change as additional evidence is gathered in favour of arbitrage pricing model and operational guidelines for applying that model are developed further. As of now, however, the CAPM appears to be the model of choice in practice.



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- The standard deviation of an n -security portfolio is:

$$\sigma_p = [\sum \sum w_i w_j \rho_{ij} \sigma_i \sigma_j]^{1/2}$$

- A portfolio is *efficient* if (and only if) there is no alternative with (i) the same $E(R_p)$ and a lower σ_p or (ii) the same σ_p and a higher $E(R_p)$ or (iii) a higher $E(R_p)$ and lower σ_p .
- Each person has a map of **indifference curves**. All the points lying on a given indifference curve offer the same level of satisfaction.
- Given the efficient frontier and the risk-return indifference curves, the **optimal portfolio** is found at the tangency between the efficient frontier and a utility indifference curve.
- If lending and borrowing can be done at the risk-free rate, the efficient frontier is simply the straight line from the risk-free rate which is tangential to the broken-egg shaped feasible region.
- The **capital market line** equation is: $E(R_p) = R_f + \lambda \sigma_p$
- The **security market line** equation is: $E(R_i) = R_f + [E(R_M) - R_f] \beta_i$
- The empirical evidence in favour of the **Capital Asset Pricing Model (CAPM)** is mixed. Yet, the CAPM is the most widely used risk return model because it is simple and intuitively appealing and its basic message that diversifiable risk does not matter is accepted by nearly everyone.
- The **Arbitrage Pricing Theory (APT)** assumes that the return on any stock is linearly related to a set of systematic factors:

$$R_i = a_i + b_{i1} I_1 + b_{i2} I_2 + \dots + b_{ik} I_k + e_i$$

- The equilibrium relationship according to APT is

$$E(R_i) = \lambda_0 + b_{i1} \lambda_1 + b_{i2} \lambda_2 + \dots + b_{ik} \lambda_k$$

- The APT does not *a priori* specify what the underlying risk factors are. A **multifactor model**, on the other hand, chooses *a priori* the exact number and identity of risk factors.
- The variety of multifactor models employed in practice fall into two categories: macroeconomic based risk factor models and microeconomic based risk factor models.

QUESTIONS

- What is the risk of a 2-security portfolio? n -security portfolio?
- What is covariance? coefficient of correlation?
- What is an efficient portfolio?
- Explain the nature of a risk-return indifference curve.
- What is the efficient frontier, when investors can lend or borrow at the risk-free rate?
- State the assumptions underlying the CAPM.
- What is the capital market line? Security market Line?
- What is the empirical evidence on the CAPM?
- Define the return-generating process and the equilibrium risk-return relationship as per the APT.
- What is a multifactor model? Describe the types of multifactor models used in practice?



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9.2 The returns of 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.

9.3 A portfolio consists of 4 securities, 1, 2, 3, and 4. The proportions of these securities are: $w_1 = 0.2$, $w_2 = 0.3$, $w_3 = 0.4$, and $w_4 = 0.1$. The standard deviations of returns on these securities (in percentage terms) are : $\sigma_1 = 4$, $\sigma_2 = 8$, $\sigma_3 = 20$, and $\sigma_4 = 10$. The correlation coefficients among security returns are: $\rho_{12} = 0.3$, $\rho_{13} = 0.5$, $\rho_{14} = 0.2$, $\rho_{23} = 0.6$, $\rho_{24} = 0.8$, and $\rho_{34} = 0.4$. What is the standard deviation of portfolio return?

MINI CASE

You have recently graduated as a major in finance and have been hired as a financial planner by Radiant Securities, a financial services company. Your boss has assigned you the task of investing Rs. 1,000,000 for a client who has a 1-year investment horizon. You have been asked to consider only the following investment alternatives: T-bills, stock A, stock B, stock C, and market index.

The economics cell of Radiant Securities has developed the probability distribution for the state of the economy and the equity researchers of Radiant Securities have estimated the rates of return under each state of the economy. You have gathered the following information from them:

Returns on Alternative Investments

<i>State of the Economy</i>	<i>Probability</i>	T-Bills	Stock A	Stock B	Stock C	<i>Market Portfolio</i>
■ Recession	0.2	6.0%	(15.0%)	30.0%	(5.0%)	(10.0%)
■ Normal	0.5	6.0	20.0	5.0	15.0	16.0
■ Boom	0.3	6.0	40.0	(15.0)	25.0	30.0

Your client is a very curious investor who has heard a lot relating to portfolio theory and asset pricing theory. He requests you to answer the following question:



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Exhibit 10.1 Call Options on NSE

Contracts (Type-Str. Price – Expiry)	Open	Premium (Rs.)	Open Int ('000)	No. of Contracts
		High	Low	Close
Call Options				
CA - 1230.00 - Dec	45.00	52.00	40.10	49.00
CA - 1260.00 - Dec	23.60	30.00	20.95	23.90
CA - 1290.00 - Dec	12.60	14.75	7.80	9.55
CA - 1320.00 - Dec	5.90	6.90	3.30	3.90
CA - 1350.00 - Dec	1.40	2.00	0.55	1.95
Put Options				
PA - 1230.00 - Dec	8.50	8.50	5.00	5.25
PA - 1260.00 - Dec	18.10	19.00	9.20	10.45
PA - 1290.00 - Dec	40.00	40.00	23.00	26.05
				148
				28

10.2 OPTIONS AND THEIR PAYOFFS JUST BEFORE EXPIRATION

This section looks at the features of call and put options and their payoffs just before expiration, from the point of view of the option holder as well as the option writer. In addition, it discusses combination options.

Call option The most common type of option, the call option, gives the option holder the right to buy an asset at a fixed price during a certain period. While there is no restriction on the kind of asset, the most popular type of call option is the option on stocks. For example, investors can buy call options on Infosys stock (and many other stocks) on the National Stock Exchange. A typical call option on Infosys stock entitles the investor to buy 100 shares of Infosys on or before say July 28, 200X at an exercise price of Rs. Y. Such an option is valuable if there is some likelihood that the price of the common (equity) stock of Infosys will rise above Rs. Y on or before July 28, 200X. To provide protection to the option holder, the option contract generally specifies that the exercise price and the number of shares will be adjusted for stock splits and stock dividends. For example, if the Infosys stock splits 4 to 1, the option contract will be for 400 shares at an exercise price of Rs. Y/4. Of course, no adjustment is made for cash dividends. Remember that the holder of a call option is not entitled to receive cash dividends.

Payoff of a Call Option What is the payoff of a European call option? To answer this question let us look at the possible payoffs of the call option just before expiration.¹ The payoff of the call option (C) just before expiration depends on the relationship between the stock price (S_1) and the exercise price (E). Formally

$$C = S_1 - E \quad \text{if } S_1 > E \tag{10.1}$$

$$C = 0 \quad \text{if } S_1 < E \tag{10.2}$$

¹ Recall that such an option can be exercised only on the expiration date, not before.



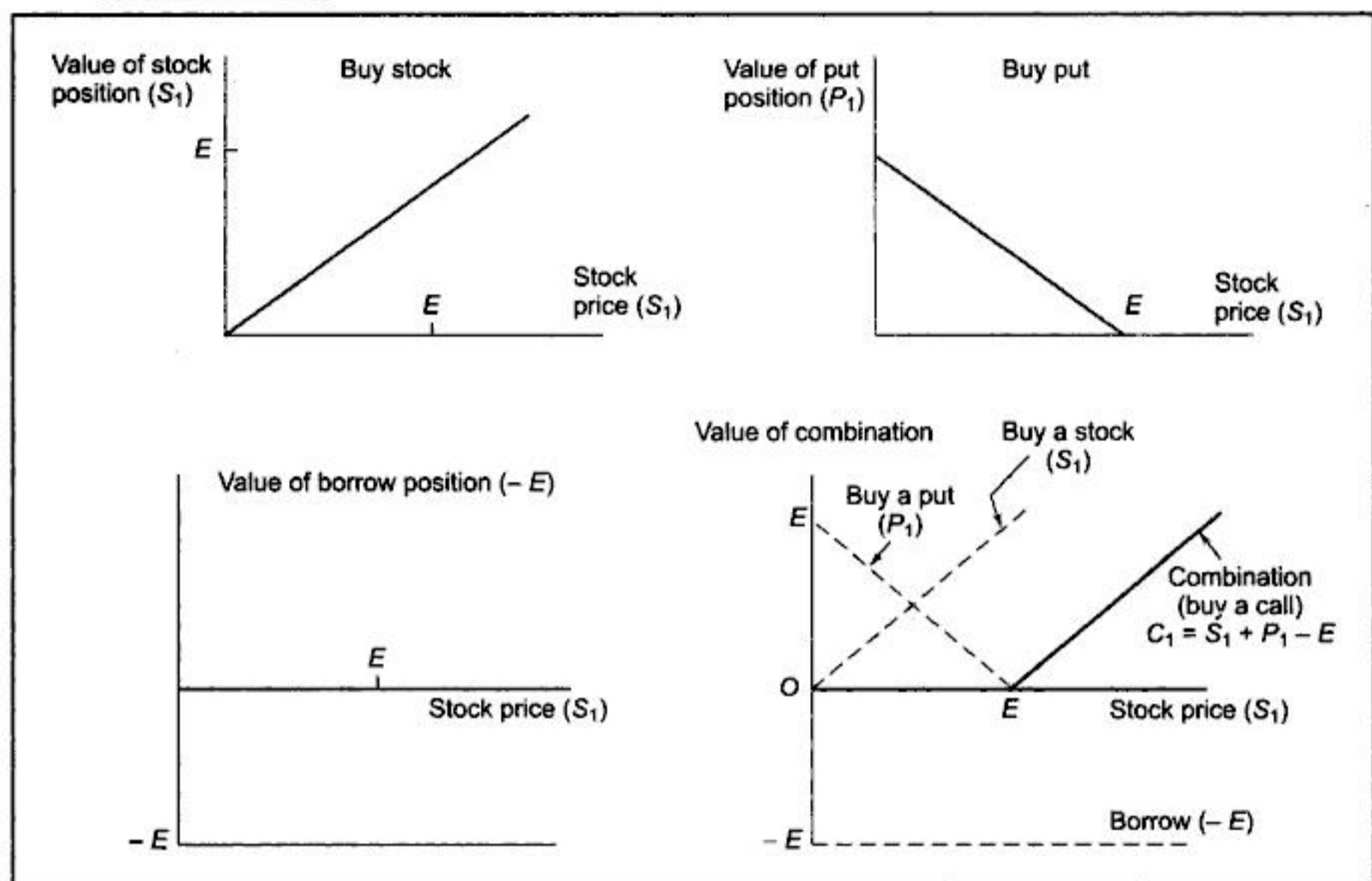
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Exhibit 10.6 Graphical Representation of the Put Call Parity Theorem**10.3 FACTORS DETERMINING OPTION VALUES**

In the previous section, we looked at the payoffs of options just before the expiration date. Now we determine the present value of options.

Boundaries Before we identify the factors determining option values, it is helpful to specify the boundaries within which the value of an option falls.

The minimum value at which a call option sells before the expiration date, say, at time zero, is $\text{Max}(0, S_0 - E)$. This means that C_0 , the value of a call option, can never fall below zero (this happens when $S_0 < E$). Also, it means that the value of a call option cannot fall below $S_0 - E$ (this happens when $S_0 > E$). To see why this is so, consider a call option with $E = 150$, $S_0 = 250$, and $C_0 = 75$. In this case it pays an investor to buy the call option for 75, exercise it for 150, and finally sell the stock for 250. By doing so he earns a profit of:

$$S_0 - (C_0 + E) = 250 - (75 + 150) = 25$$

This profit, reflecting arbitrage profits, comes without incurring any risk or cost. Such a profit cannot occur in a well functioning financial market. Hence in such a market C_0 cannot sell for less than $S_0 - E$.

What is the upper limit for the option price? A call option entitles the holder to buy the underlying stock on payment of a certain exercise price. Hence its value cannot be greater



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- The value of R is greater than d but smaller than u ($d < R < u$). This condition ensures that there is no risk-free arbitrage opportunity.
- The exercise price is E .

The value of the call option, just before expiration, if the stock price goes up to uS , is

$$C_u = \text{Max}(uS - E, 0) \quad (10.6)$$

Likewise, the value of the call option, just before expiration, if the stock price goes down to dS is

$$C_d = \text{Max}(dS - E, 0) \quad (10.7)$$

Let us now set up a portfolio consisting of Δ shares of the stock and B rupees of borrowing. Since this portfolio is set up in such a way that it has a payoff identical to that of a call option at time 1, the following equations will be satisfied:

$$\text{Stock price rises: } \Delta uS - RB = C_u \quad (10.8)$$

$$\text{Stock price falls: } \Delta dS - RB = C_d \quad (10.9)$$

Solving Eqs (10.8) and (10.9) for Δ and B , we get

$$\Delta = \frac{C_u - C_d}{S(u - d)} = \frac{\text{Spread of possible option prices}}{\text{Spread of possible share prices}} \quad (10.10)$$

$$B = \frac{dC_u - uC_d}{(u - d)R} \quad (10.11)$$

Since the portfolio (consisting of Δ shares and B debt) has the same payoff as that of a call option, the value of the call option is

$$C = \Delta S - B \quad (10.12)$$

Note that the value of option is found out by looking at the value of a portfolio of Δ shares and loan that imitates the option in its payoff. So this may be referred to as the option equivalent calculation. Note that Δ is called the *hedge ratio*, or *option delta*.

To illustrate the application of the binomial model consider the following data for Pioneer's stock:

$$S = 200, u = 1.4, d = 0.9$$

$$E = 220, r = 0.10, R = 1.10$$

$$C_u = \text{Max}(uS - E, 0) = \text{Max}(280 - 220, 0) = 60$$

$$C_d = \text{Max}(dS - E, 0) = \text{Max}(180 - 220, 0) = 0$$

Given the above data, we can get the values of Δ and B by using Eqs (10.10) and (10.11).

$$\Delta = \frac{C_u - C_d}{(u - d)S} = \frac{60}{0.5(200)} = 0.6$$

$$B = \frac{dC_u - uC_d}{(u - d)R} = \frac{0.9(60)}{0.5(1.10)} = 98.18$$

Thus the portfolio consists of 0.6 of a share plus a borrowing of 98.18 (entailing a repayment of $98.18(1.1) = 108$ after one year). The identity of the payoffs of the portfolio and call option is shown below:



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Step 2 Find $N(d_1)$ and $N(d_2)$. $N(d_1)$ and $N(d_2)$ represent the probabilities that a random variable that has a standardised normal distribution will assume values less than d_1 and d_2 . The simplest way to find $N(d_1)$ and $N(d_2)$ is to use the Excel function NORMSDIST.

$$N(d_1) = N(0.7614) = 0.7768$$

$$N(d_2) = N(0.5493) = 0.7086$$

If you don't have easy access to the Excel function NORMSDIST, you can get a very close approximation by using the Normal Distribution given in Table A.5 in Appendix A at the end of the book. The procedure for doing that may be illustrated with respect to $N(0.7614)$ as follows:

1. 0.7614 lies between 0.75 and 0.80.
2. According to the table, $N(0.75) = 1 - 0.2264$
 $= 0.7736$ and $N(0.80) = 1 - 0.2119 = 0.7881$
3. For a difference of 0.05 ($0.80 - 0.75$) the cumulative probability increases by 0.0145 ($0.7881 - 0.7736$)
4. The difference between 0.7614 and 0.75 is 0.114
5. So, $N(0.7614) = N(0.75) + \frac{0.0114}{0.05} \times 0.0145 = 0.7736 + 0.0033 = 0.7769$

This value is indeed a close approximation for the true value 0.7768.

Step 3 Estimate the present value of the exercise price, using the continuous discounting principle

$$\frac{E}{e^{rt}} = \frac{\text{Rs. } 56}{e^{0.14 \times 0.5}} = \text{Rs. } 52.21$$

Step 4 Plug the numbers obtained in the previous steps in the Black-Scholes formula

$$\begin{aligned} C_0 &= \text{Rs. } 60 \times 0.7768 - \text{Rs. } 52.21 \times 0.7086 \\ &= \text{Rs. } 46.61 - \text{Rs. } 37.00 = \text{Rs. } 9.61 \end{aligned}$$

A spreadsheet illustration of the above is as under:

	A	B	C
1	Price of stock now S_0		60
2	Exercise price E		56
3	Standard deviation of continuously compounded annual return σ		0.3
4	Years to maturity t		0.5
5	Interest rate per annum r		0.14
6		$=(\text{LN}(C1/C2)+(\text{C5}+(\text{C3}^2)/2*\text{C4})/(\text{C3}*(\text{C4}^{0.5}))$	0.7613
7		$=\text{C6}-\text{C3}*(\text{C4}^{0.5})$	0.5492
8	Equilibrium value of call option now C_0	$=\text{C1}*\text{NORMSDIST}(\text{C6})-(\text{C2}/\text{EXP}(\text{C5}*\text{C4}))*\text{NORMSDIST}(\text{C7})$	9.61



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Suppose a firm issues risky bonds with a promise to pay B_1 in year 1. The value of these bonds depends on the value of the firm in year 1, V_1 , as follows:

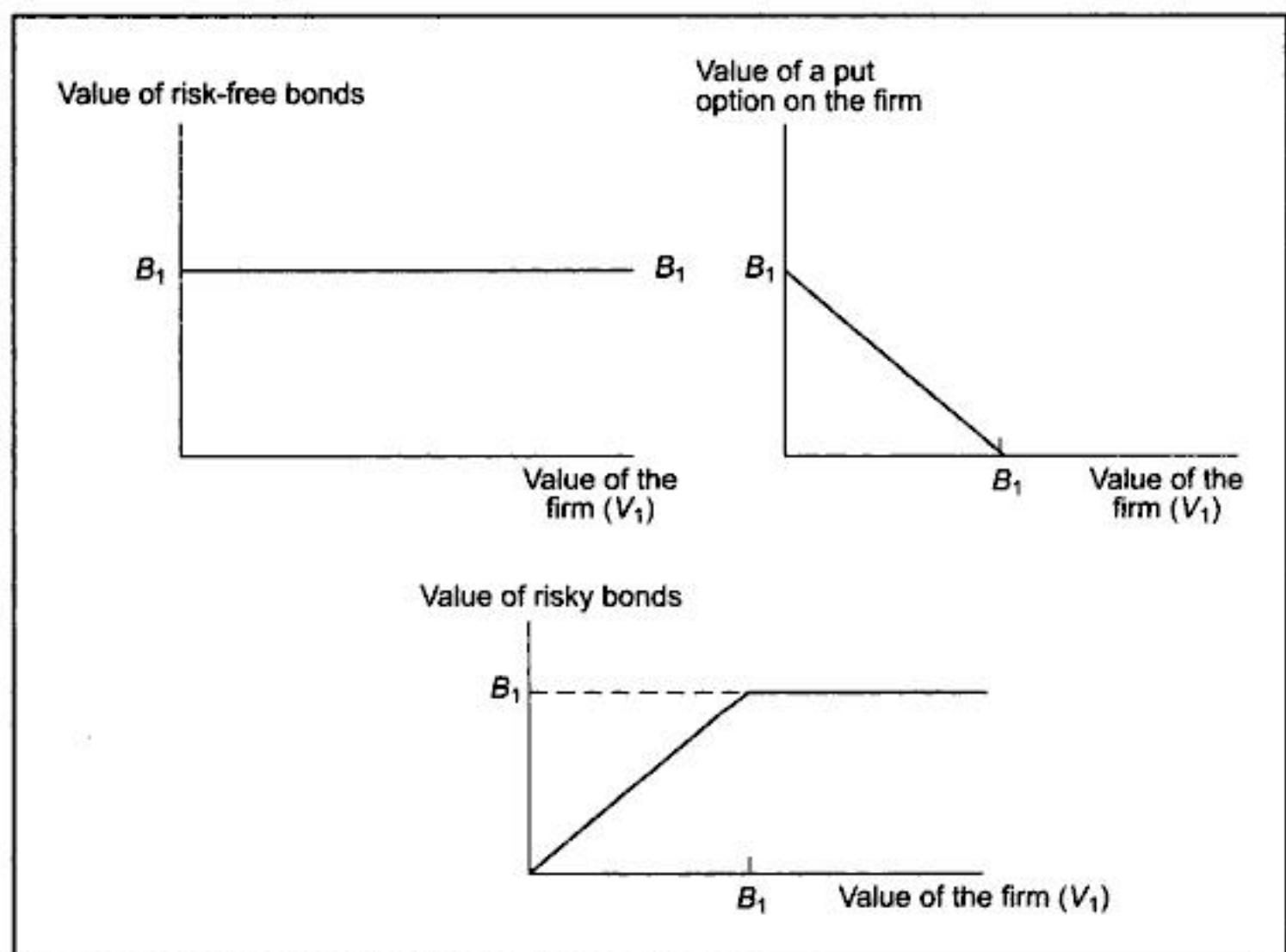
	<i>Outcome</i>	
	$V_1 < B_1$	$V_1 \geq B_1$
<i>Value of the bonds</i>	V_1	B_1

Value of Risky Bonds The payoff of risky bonds is $\text{Min}(V_1, B_1)$. This is equivalent to the value of a risk-free bond minus the value of a put option on the assets of the firm, exercisable at B_1 , held by equity stockholders. The algebra of this equivalence is shown below:

	<i>Outcome</i>	
	$V_1 < B_1$	$V_1 \geq B_1$
Risk-free bonds	B_1	B_1
- Value of a put option on the firm	$(B_1 - V_1)$	0
= Value of the risky bonds	V_1	B_1

The above relationship is shown diagrammatically in Exhibit 10.11.

Exhibit 10.11 Value of Risky Bonds





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10.3 The following information is available for the equity stock of Prakash Limited.

$$S_0 = \text{Rs. } 120, E = \text{Rs. } 110, r_f = 0.12, \sigma = 0.40$$

Calculate the price of a 6 month call option as per the Black-Scholes model.

Solution:

$$C_0 = S_0 N(d_1) - \frac{E}{e^{rt}} N(d_2)$$

$$d_1 = \frac{\ln\left(\frac{S_0}{E}\right) + \left(r + \frac{1}{2}\sigma^2\right)t}{\sigma\sqrt{t}}$$

$$d_2 = d_1 - \sigma\sqrt{t}$$

$$d_1 = \frac{\ln\left(\frac{120}{E}\right) + \left(0.12 + \frac{1}{2} \times 0.16\right)0.5}{0.4\sqrt{0.5}}$$

$$= \frac{0.0870 + 0.10}{0.2828} = 0.6612$$

$$d_2 = 0.6612 - 0.2828 = 0.3784$$

$$N(d_1) = N(0.6612) = 0.7457$$

$$N(d_2) = N(0.3784) = 0.6474$$

$$\frac{E}{e^{rt}} = \frac{110}{e^{0.12 \times 0.5}} = \frac{110}{1.0618} = 103.60$$

$$C_0 = \text{Rs. } 120 \times 0.7457 - \text{Rs. } 103.60 \times 0.6474 = \text{Rs. } 22.41$$

10.4 Prabhu Limited has a current value of 10,000. The face value of its outstanding bonds (the only debt on its balance sheet) is 8000. These are 1 year discount bonds with an obligation of 8000 in year 1. The risk-free interest rate is 12.7 percent and the variance of the continuously compounded rate of return on the firm's assets is 25 percent. What is the present value of Prabhu Limited's equity, S_0 , and debt B_0 ?

Solution

$$S_0 = V_0 N(d_1) - \frac{B_1 N(d_2)}{e^{rt}}$$

$$d_1 = \left[\ln\left(\frac{V_0}{B_1}\right) + \left(r + \frac{1}{2}\sigma^2\right)t \right] / \sigma\sqrt{t}$$

$$= \left[\ln\frac{10000}{8000} + (0.127 + \frac{1}{2} \times 0.25)1 \right] / 0.5\sqrt{1}$$

$$= [0.223 + 0.245]/0.5 = 0.95$$



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Techniques of Capital Budgeting

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



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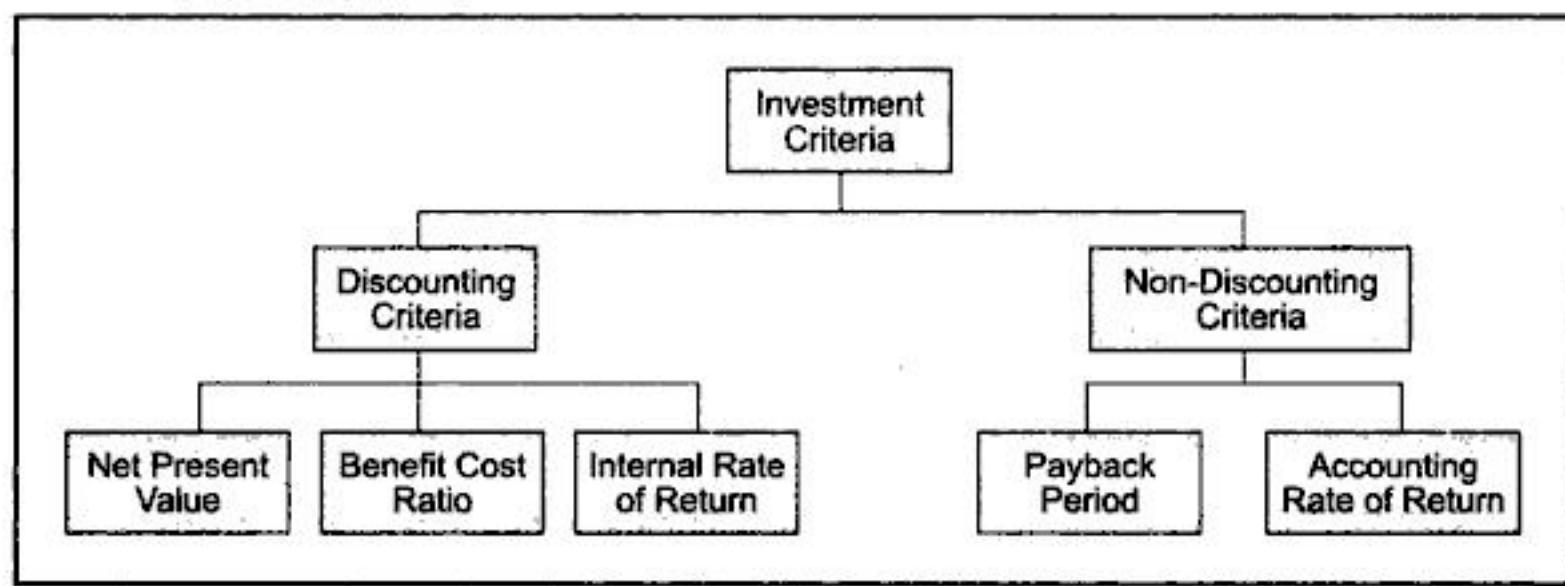
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is no standard approach for evaluating these projects and decisions regarding them are based on personal preferences of top management.

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:

$$\text{NPV of Project} = \sum_{t=1}^n \frac{C_t}{(1+r)^t} - \text{Initial investment} \quad (11.1)$$

where C_t is the cash flow at the end of year t , n is the life of the project, and r is the discount rate.

To illustrate the calculation of net present value, consider a project which has the following cash flow stream:

Year	Cash Flow
0	Rs. (1,000,000)
1	200,000
2	200,000
3	300,000
4	300,000
5	350,000



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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 Rs. 100,000. Both the proposals have an expected life of 4 years after which their salvage value would be nil.

Year	A				B			
	Book value	Depre- ciation	Profit after tax	Cash flow	Book value	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 percent, 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.

11.10 INVESTMENT APPRAISAL IN PRACTICE

A survey of capital budgeting practices in India, conducted by U. Rao Cherukuri, revealed the following:

- Over time, discounted cash flow methods have gained in importance and internal rate of return is the most popular evaluation methods.
- Firms typically use multiple evaluation methods.
- Accounting rate of return and payback period are widely employed as supplementary evaluation methods.
- Weighted average cost of capital is the most commonly used discount rate and the most often used discount rate is 15 percent in post-tax terms.
- Risk assessment and adjustment techniques have gained popularity. The most popular risk assessment technique is sensitivity analysis and the most common methods for risk adjustment are shortening of the payback period and increasing the required rate of return.



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Product Market Life of the Plant A plant may be physically usable, its technology may not be obsolete, but the market for its products may disappear or shrink and hence its continuance may not be justified. The product market life of a plant refers to the period for which the product of the plant enjoys a reasonably satisfactory market.

Investment Planning Horizon of the Firm The time period for which a firm wishes to look ahead for purposes of investment analysis may be referred to as its investment planning horizon. It naturally tends to vary with the complexity and size of the investment. For small investments (say, installation of a lathe) it may be five years, for medium-size investments (say, expansion of plant capacity) it may be 10 years, and for large-size investments (say, setting up of a new division) it may be 15 years.

12.2 ■ BASIC PRINCIPLES OF 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 Rs. 1,000 in fixed assets and working capital at time 0. The project is expected to generate a cash inflow of Rs. 1200 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 percent 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:

Project			
Financing side		Investment side	
Time	Cash flow	Time	Cash flow
0	+ 1,000	0	- 1,000
1	- 1,150	1	+ 1,200
Cost of capital: 15%		Rate of return: 20%	



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■ Computers	: 60%
■ Vehicles on hire	: 40%
■ Pollution control equipment	: 100%

Consistency Principle

Cash flows and the discount rates applied to these cash flows must be consistent with respect to the investor group and inflation.

Investor Group The cash flow of a project may be estimated from the point of view of all investors (equity shareholders as well as lenders) or from the point of view of just equity shareholders.

The cash flow of a project from the point of view of all investors is the cash flow available to all investors after paying taxes and meeting investment needs of the project, if any. It is estimated as follows:

$$\begin{aligned}\text{Cash flows to all investors} = & \text{ PBIT (1 - tax rate)} \\ & + \text{ Depreciation and noncash charges} \\ & - \text{ Capital expenditure} \\ & - \text{ Change in working capital}\end{aligned}$$

The cash flow of a project from the point of view of equity shareholders is the cash flow available to equity shareholders after paying taxes, meeting investment needs, and fulfilling debt-related commitments. It is estimated as follows:

$$\begin{aligned}\text{Cash flow to equity shareholders} = & \text{ Profit after tax} \\ & + \text{ Depreciation and other noncash charges} \\ & - \text{ Preference dividend} \\ & - \text{ Capital expenditures} \\ & - \text{ Change in working capital} \\ & - \text{ Repayment of debt} \\ & + \text{ Proceeds from debt issues} \\ & - \text{ Redemption of preference capital} \\ & + \text{ Proceeds from preference issue}\end{aligned}$$

The discount rate must be consistent with the definition of cash flow:

<i>Cash flow</i>	<i>Discount rate</i>
Cash flow to all investors	Weighted average cost of capital
Cash flow to equity	Cost of equity

Generally, in capital budgeting we look at the cash flow to all investors and apply the weighted average cost of capital of the firm. We will also follow this convention.

Inflation In dealing with inflation, you have two choices. You can incorporate expected 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.



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12.3 Teja International 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 Rs. 800,000 and it can be sold to realise a post tax salvage value of Rs. 900,000. It has a remaining life of five years after which its net salvage value is expected to be Rs. 200,000. It is being depreciated annually at a rate of 25 percent the WDV method.

The new machine costs Rs. 3,000,000. It is expected to fetch a net salvage value of Rs. 1,500,000 after five years. The depreciation rate applicable to it is 25 percent under the WDV method. The new machine is expected to bring a saving of Rs. 650,000 annually in manufacturing costs (other than depreciation). The incremental working capital associated with this machine is Rs. 500,000. The tax rate applicable to the firm is 30 percent.

- (a) Estimate the cash flow associated with the replacement project.
- (b) What is the NPV of the replacement project if the cost of capital is 14 percent?

12.4 A machine costs Rs. 100,000 and is subject to a depreciation rate of 25 percent under the WDV method. What is the present value of the tax savings on account of depreciation for a period of 5 years if the tax rate is 40 percent and the discount rate is 15 percent?

12.5 Mahima Enterprises is considering replacing an old machine by a new machine. The old machine bought a few years ago has a book value of Rs. 90,000 and it can be sold for Rs. 90,000. It has a remaining life of five years after which its net salvage value is expected to be Rs. 10,000. It is being depreciated annually at the rate of 20 percent as per the WDV method.

The new machine costs Rs. 400,000. It is expected to fetch a net salvage value of Rs. 25,000 after 5 years. It will be depreciated annually at the rate of 25 percent as per the WDV method. Investment in working capital will not change with the new machine. The tax rate for the firm is 35 percent. Estimate the cash flow associated with the replacement proposal, assuming that other costs remain unchanged.

MINI CASE

After seeing Snapple's success with fruit drinks, the board of directors of Modern Foods is seriously considering a proposal for a lemon juice project.

You have been recently hired as a financial analyst by Modern Foods and you report to Mahajan, the CEO of the company. You have been entrusted with the task of evaluating the project.

The lemon juice would be produced in an unused building adjacent to the main plant of Modern Foods. The building, owned by Modern Foods, is fully depreciated. However, it can be rented out for an annual rental of Rs. 1 million. The outlay on the project is expected to be Rs. 25 million – Rs. 15 million toward plant and machinery and Rs. 10 million toward gross working capital. You can assume that the outlay will occur right in the beginning. This means that there is no interest during the construction period.

The proposed scheme of financing is as follows: Rs. 10 million of equity, Rs. 8 million of term loan, Rs. 5 million of working capital advance, and Rs. 2 million of trade credit.



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Obviously, decision tree analysis requires enormous information before it can be applied. It may be difficult to apply decision tree analysis to a project where the product or service is new and the firm has very little information on how the market will respond to it. Decision trees are also not easy to apply when investments are gradually made over a period of time rather than in a few well-defined stages.

13.8 ♦ CORPORATE RISK ANALYSIS

A project's corporate risk is its contribution to the overall risk of the firm. Put differently, it reflects the impact of the project on the risk profile of the firm's total cash flows.

In a previous chapter we learnt that the contribution of a security to portfolio risk depends on (i) the standard deviation of its returns and (ii) the correlation of its returns with the returns on the other securities included in the portfolio. Just the same way, the corporate risk of a project depends on (i) the standard deviation of its returns and (ii) the correlation of its returns with the returns on the other projects of the firm.

On a stand-alone basis a project may be very risky but if its returns are not highly correlated—or, even better, negatively correlated—with the returns on the other projects of the firm, its corporate risk tends to be low.

Aware of the benefits of portfolio diversification, many firms consciously pursue a strategy of diversification. Hindustan Lever Limited, for example, has a diversified portfolio comprising, in the main, of the following businesses: soaps and detergents, personal care products, food, and tea.

The proponents of diversification argue that it helps in reducing the firm's overall risk exposure. As most businesses are characterised by cyclicalities it seems desirable that there are at least two to three different lines of business in a firm's portfolio. As someone put it vividly: "If you have three legs to your firm, you enjoy a reasonable degree of stability.". This is simply another way of saying that don't put all your eggs in the same basket.

The logic of corporate diversification for reducing risk, however, has been questioned. Why should a firm diversify when shareholders can reduce risk through personal diversification. All that they have to do is to hold a diversified portfolio of securities or participate in a mutual fund scheme. Indeed, they can do it more efficiently

There does not seem to be an easy answer. Although shareholders can reduce risk through personal diversification there are some other benefits from corporate diversification. Stable earnings and cash flows enable a firm to attract talent, to secure greater commitment from various stakeholders, to exploit tax shelters fully, and to check adverse managerial incentives. Hence, most firms do look at the impact of investment proposals, particularly the major ones, on the overall risk profile of the firm.

13.9 ♦ MANAGING RISK

Managers are not merely content with measuring risk. They want to explore ways and means of mitigating risk. Some of the ways of doing this are discussed below. These risk reduction strategies have a cost associated with them, and whether they are profitable in a given situation will depend on circumstances.



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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
Rs. 1,000	0.3
Rs. 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: Rs. 3,000. This amount – Rs. 3,000—represents the certainty equivalent of the above lottery which has an expected value of Rs. 3,800 ($\text{Rs. } 1,000 \times 0.3 + \text{Rs. } 5,000 \times 0.7$) 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:

$$\text{NPV} = \sum_{t=1}^n \frac{\alpha_t \bar{C}_t}{(1+i)^t} - I \quad (13.7)$$

where NPV is the net present value, \bar{C}_t is the expected cash flow for year t , α_t is the certainty equivalent coefficient for the cash flow of year t , i is the risk free interest rate and I is the initial investment (about which it is assumed that there is no uncertainty)

Let us look at an example. Vazeer Hydraulics Limited is considering an investment proposal involving an outlay of Rs. 4,500,000. The expected cash flows and certainty equivalent coefficients are:

Year	Expected Cash Flow	Certainty Equivalent Coefficient
1	Rs. 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 percent. Calculate the net present value of the proposal. The net present value is equal to:

$$\frac{1,000,000(0.90)}{(1.05)} + \frac{1,500,000(0.85)}{(1.05)^2} + \frac{2,000,000(0.82)}{(1.05)^3} + \frac{2,500,000(0.78)}{(1.05)^4} - 4,500,000 \\ = \text{Rs. } 534,570$$

The value of the certainty equivalent coefficient usually ranges between 0.5 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-adverse. 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.



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16.4 ■ EMPIRICAL EVIDENCE

Empirical Evidence on Weak Form Efficient Market Hypothesis

The weak-form efficient market hypothesis says that the current price of a stock reflects all information found in the record of past prices and volumes. This means that there is no relationship between the past and future price movements.

Three types of tests have been commonly employed to empirically verify the weak-form efficient market hypothesis: (a) serial correlation tests; (b) runs tests; and (c) filter rules tests.

Serial Correlation Tests One way to test for randomness in stock price changes is to look at their serial correlations (also called auto-correlations). Is the price change in one period correlated with the price change in some other period? If such auto-correlations are negligible, the price changes are considered to be serially independent. Numerous serial correlation studies, employing different stocks, different time-lags, and different time-period, have been conducted to detect serial correlations. In general, these studies have failed to discover any significant serial correlations. Remember that these studies were concerned only with short-term trends (daily, weekly, fortnightly, monthly, etc.) and not long-term trends in stock prices; we know that in the long-term stock prices tend to move upwards.

Runs Tests Given a series of stock price changes, each price change is designated as a plus (+) if it represents an increase or a minus (-) if it represents a decrease. The resulting series, for example, may look as follows:

+ + - + + - - +

A run occurs when there is no difference between the sign of two changes. When the sign of change differs, the run ends and a new run begins. For example, in the above series of pluses and minuses, there are five runs as follows:

++ - ++ -- +
 \u2044 1 2 3 4 5

To test a series of price changes for independence, the number of runs in that series is compared to see whether it is statistically different from the number of runs in a purely random series of the same size. Many studies have been carried out, employing the 'runs test' of independence. By and large, the results of these studies seem to strongly support the random walk model.

Filter Rules Tests An n percent filter rule may be defined as follows: "If the price of a stock increases by at least n percent, buy and hold it until its price decreases by at least n percent from a subsequent high. When the price decreases by at least n percent or more, sell it." If the behaviour of stock price changes is random, filter rules should not outperform a simple buy-and-hold strategy. Many studies have been conducted employing different stocks and different filter rules. By and large, they suggest that filter rules do not outperform a simple buy-and-hold strategy, particularly after considering the commissions on transactions.



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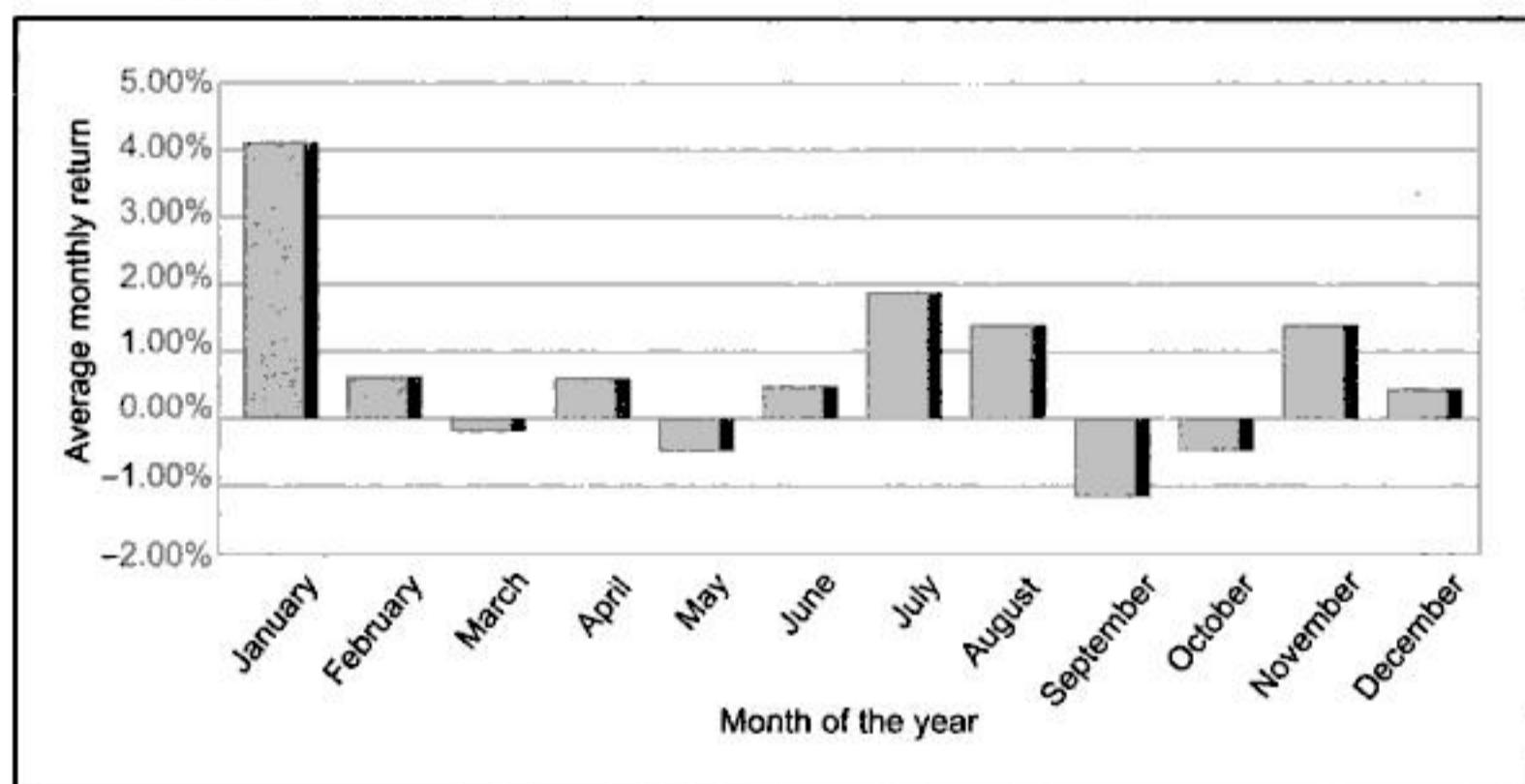


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Another puzzling calendar anomaly is the January effect. Stock prices seem to rise more in January than in any other month of the year. Exhibit 16.3 shows the average return for US stocks by the end of the year from 1926 to 1983. Several explanations have been offered to explain the January effect. First, investors sell the stocks on which they have lost money in December to get the tax benefit from capital loss and buy them back in January. Second, in the first few weeks of January a lot of information is revealed about the firms. Third, there are substantial inflows to portfolios around the turn of the year. These explanations, at best, seem to be partial explanations and the January effect remains, in an important sense, an anomaly.

Excess Volatility Robert Shiller⁴ and others have argued that investors pursue fads and behave like a herd. As a result stock market overreacts to events. To prove his point, he has marshalled evidence suggesting that the volatility of stock prices is too large to be justified by the volatility of dividends.

Exhibit 16.3 January Effect



Normal Range of Interest Rates Market interest rates move within a normal range. Hence when interest rates are close to the high end of the range they are likely to decrease. By the same token, when interest rates are toward the low end of the range, they are likely to increase. This hypothesis is supported by the evidence on yield curve, which is a plot of spot interest rates against different maturities, ranging from short term to long term. The yield curve which reflects future expectations about interest rates is typically downward sloping when the interest rates are high and upward sloping when the interest rates are low.

The Crash of 1987 On October 19, 1987, the Dow Jones Industrial Average, the most widely followed stock market index of the US or the whole world, crashed by 23 percent in one day. There was obviously no new fundamental information to justify such a

⁴ R.J. Shiller, "Do Stock Prices Move Too Much to Be Justified by Subsequent Changes in Dividends?" *American Economic Review*, Vol. 71 (1981 a).



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- **Winner's Curse** Investors may be divided two categories, viz., 'informed' and 'uninformed'. In general, financial institutions are likely to be informed and individual investors uninformed. Individual investors, uninformed as they are, tend to be victims of the winner's curse. When they receive allotment of shares they have applied for in an IPO, it may be because the shares are overpriced and informed investors have, in general, stayed away from the issue. Hence, the uninformed investors will need an incentive in the form of substantial underpricing of the IPO to remain in the market.
- **Bait for Future Offerings** A company making an IPO would like the investors to have a rewarding experience. Satisfied investors develop a loyalty toward the company. This helps the company in raising more capital at a higher price in future.
- **Informational Asymmetry** In general, merchant bankers (also referred to as investment bankers) know the market better than the issuing company. They may exploit this superior knowledge to underprice issues. This makes their job easier and helps them earn the goodwill of investors.
- **Regulatory Constraints** Sometimes regulatory guidelines lead to underpricing. During the days of the Controller of Capital Issues, the issue price in India was governed by a very conservative formula.
- **Political Goals** Companies may deliberately underprice their issues and allot them to people in power. In Japan, for example, the Recruitment Company sold the shares of its subsidiary Cosmos through a severely underpriced IPO to several politicians including the then Prime Minister Takeshita (when the scandal was exposed Takeshita had to resign). In UK, Margaret Thatcher privatised firms like British Airways and British Steel through underpriced IPOs to garner acceptance for her privatisation initiatives and promote popular capitalism.

18.3 ■ SECONDARY 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 secondary public offers) or rights issues offered to existing shareholders. This section looks at a public issue and the following at a rights issue.

The procedure for a secondary 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 secondary public offer as well. However, a secondary public offer is subject to fewer regulations, when compared to an IPO.

The key provisions applicable to a secondary public offer are as follows:

- A listed company is eligible to a public offer of equity shares or a convertible security 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



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predetermined price is referred to as a preferential allotment. Generally, preferential allotment is made to promoters, strategic investors, venture capitalists, financial institutions, and suppliers. The rationale for preferential allotment is to secure the equity participation of those the company considers desirable, but who may otherwise find it very costly or impractical to buy large chunks of shares in the market. A preferential allotment is not related to a public issue and it should not be confused with reservations that may be made on a preferential basis for certain categories of investors in a public issue.

Regulations 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 81(1A) 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.

Open Offer A preferential allotment of more than 15 percent of the equity necessitates an open offer to the existing shareholders under the SEBI takeover code.

Lock-in Period Securities issued to the promoter group by way of a preferential allotment are subject to a lock-in period of 1 year—this means that they are not transferable for that period. However, securities issued to other categories of investors by way of a preferential allotment are not subject to any lock-in period.

18.7 DILUTION

When a firm plans to sell securities, dilution is an issue that often comes up for discussion. We can think of dilution in terms of proportionate ownership or market value or book value or earnings per share.

Dilution of Proportionate Ownership Dilution of proportionate ownership occurs whenever a firm sells shares to the general public. For example, Ramesh owns 10,000 shares of Bharat International which currently has 100,000 outstanding shares. Thus Ramesh controls 10 percent ($10,000/100,000$) of the votes and has a claim to 10 percent of the income and assets of the firm.

If Bharat International issues 100,000 new equity shares through a public issue and Ramesh does not participate in this issue, his ownership stake will drop to 5 percent($10,000/200,000$).



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<i>Underwriting commitment</i>	<i>Shares procured</i>
A	70,000
B	50,000
C	40,000
D	25,000
E	15,000

Determine the liability of each underwriter.

- 18.2 The equity stock of Narmada Foods is selling for Rs. 180 per share. The firm is planning to issue rights shares in the ratio of one right share for every existing five shares:
- What is the theoretical value of a right if the subscription price is Rs. 150?
 - What is the ex-rights value per share if the subscription price is Rs. 160?
 - What is the theoretical value per share when the stock goes ex-rights, if the subscription price is Rs. 180? Rs. 100?

MINI CASE

PTR is a venerable restaurant of Bangalore set up decades ago by Prakash Naik. Despite its phenomenal success, Prakash Naik was unwilling to set up branches because he was concerned about the dilution of quality. In the last decade, however, alluring business opportunities and competitive compulsions persuaded Prakash Naik to set up a few branches of PTR at select locations in Bangalore and Chennai. This initiative, financed mainly through internal accruals, turned out to be quite profitable. Buoyed by this success, the Naik family, which owns 100 percent equity of PTR Limited, has chalked up an ambitious plan to set up a nation-wide chain of PTR restaurants and to support this initiative it wants to raise Rs. 100 crore through an initial public offering.

Prakash Naik has asked you to brief the family members on various issues associated with the move, by answering the following questions

- What the pros of going public?
- What are the cons of going public?
- What conditions should a company satisfy to make an IPO?
- What is book building?
- What are the principal steps in an IPO?
- What role is played by the lead manager?
- What are the costs of a public issue?
- Can a company making a public issue freely price its shares?
- Why is under-pricing of IPOs a universal phenomenon?
- What is a rights issue?
- What are the different kinds of dilution?





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P
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CAPITAL STRUCTURE AND DIVIDEND DECISIONS

19 Capital Structure and Firm Value

20 Capital Structure Decision

21 Dividend Policy and Firm Value

22 Dividend Decision

VI



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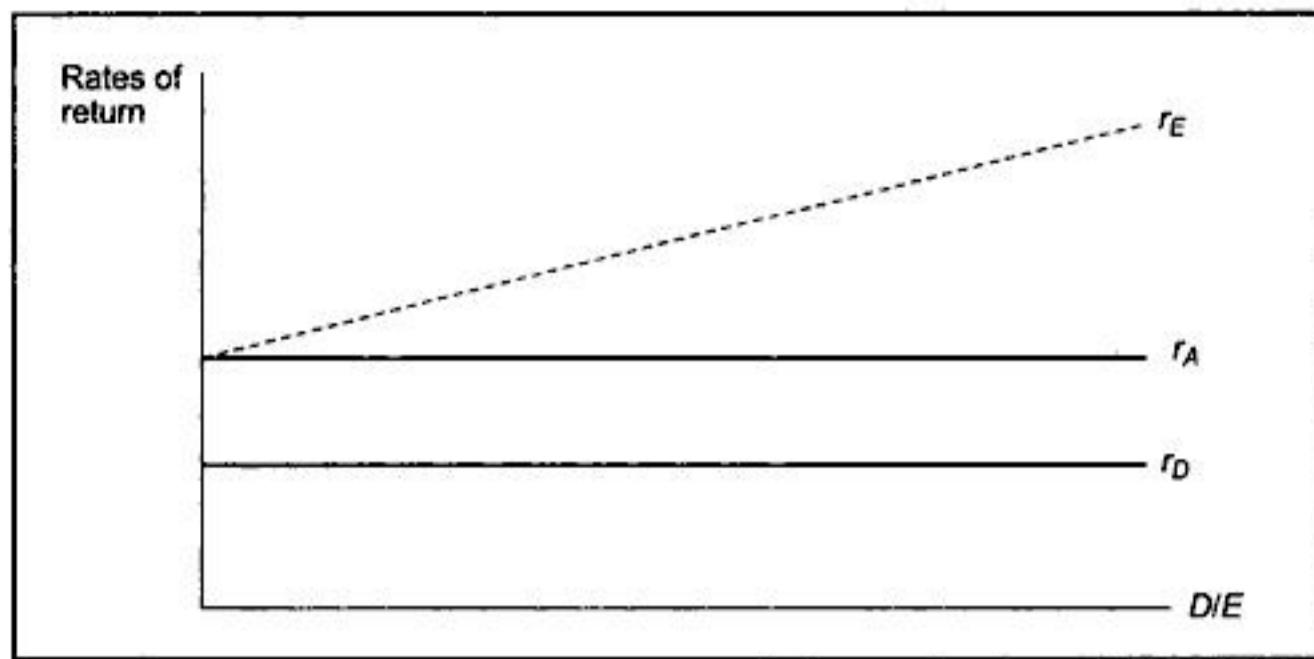
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Exhibit 19.2 Behaviour of r_A , r_D , and r_E as per the Net Operating Income Approach


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 shown below:

	Firm A	Firm B
O Net operating income	10,000	10,000
r_A Overall capitalisation rate	0.15	0.15
V Total market value	66,667	66,667
I Interest on debt	1,000	3,000
r_D Debt capitalisation rate	0.10	0.10
D Market value of debt	10,000	30,000
E Market value of equity	56,667	36,667
D/E Degree of leverage	0.176	0.818

The equity capitalisation rates of firms A and B are as follows:

$$\text{Firm A: } \frac{\text{Equity earnings}}{\text{Market value of equity}} = \frac{9,000}{56,667} = 0.159 = 15.9\%$$

$$\text{Firm B: } \frac{\text{Equity earnings}}{\text{Market value of equity}} = \frac{7,000}{36,667} = 0.191 = 19.1\%$$



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When investors sell their equity in firm L and buy the equity in firm U with personal leverage, the market value of firm L tends to decline and the market value of firm U tends to rise. This process continues until the 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 becomes the same.

The above argument can be easily generalised. Consider the same two firms, an unlevered firm (U) and a levered firm (L), which have identical EBIT but different capital structures. Because firm U has no debt its market value, V_U , is the same as its equity value, E_U . For firm L , however, the market value of equity, E_L , is the value of the firm less the value of its debt; this means that $E_L = V_L - D_L$.

If an investor owns 10 percent of firm L 's stock, his investment and return would be as follows:

	<i>Investment</i>	<i>Income</i>
Equity	.10 E_L = .10 ($V_L - D_L$)	.10 (EBIT - Interest)

Alternatively, if he borrows 0.10 D_L on personal account and buys 10 percent of firm U 's equity, his investment and income would be as follows:

	<i>Investment</i>	<i>Income</i>
Equity	.10 E_U	.10 EBIT
Borrowing	-.10 D_L = .10 ($V_U - D_L$)	-.10 Interest = .10 (EBIT - Interest)

Both the strategies provide the same income (10 percent of the profit of the firm after interest) and have the same risk exposure. In an efficient market, investments that provide the same income and have the same risk must sell at the same price. So

$$.10 (V_L - D_L) = .10 (V_U - D_L)$$

Hence, the value of the unlevered firm, V_U must be the same as the value of the levered firm, V_L .

It makes no difference whether investors love risk or abhor risk. All would agree that the unlevered firm U and the levered firm L should have the same value. If investors can borrow and lend on their personal account on the same terms as the firm, they can mimic whatever a firm can do. Hence the value of the firm will be independent of its capital structure.

Illustration Ram Electronics currently is an all-equity financed company. Its financials are as follows:

Expected operating income	: Rs. 4,000,000
Number of shares	: 1,000,000
Earnings per share	: Rs. 4
Dividend per share	: Rs. 4
(All earnings are paid as dividends)	



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- firms that have valuable intangible growth options. Such firms should employ lesser debt in comparison to firms whose assets are mostly in the form of tangible assets.
- Due to problems of asymmetric information and floatation costs, low growth firms should follow a pecking order in which retained earnings are followed by debt and then by external equity. High growth firms depending mainly on tangible assets should also follow the same pecking order but they will have to rely on external equity along with debt. However, high growth firms depending mainly on intangible growth options, should rely on external equity rather than debt because financial distress can impose severe penalties on them.
 - Because of the problem of asymmetric information, firms would do well to maintain reserve borrowing capacity which will enable them to exploit profitable investment opportunities without issuing equity shares at a low price. The need to maintain reserve borrowing power implies that the actual debt ratio will be lower compared to what is suggested by the trade-off theory.

SUMMARY

- Several positions have been taken on the relationship between capital structure and firm value. The **net income approach** says that the average cost of funds declines as the leverage ratio increases. The **net operating income approach** holds that the cost of capital remains unchanged when the leverage ratio varies. The **traditional approach** argues that the cost of capital decreases as the leverage ratio increases, up to a point, but thereafter the cost of capital increases with the leverage ratio. The **Modigliani and Miller position (MM)** is similar to the net operating income approach.
- The **MM position** is stated in terms of two basic propositions. MM's first proposition is that the value of a firm is equal to its expected operating income divided by the discount rate appropriate to its risk class: $V = D + E = O/r$. MM's second proposition says that the expected return on equity is equal to the expected return on assets, plus a premium: $r_E = r_A + (r_A - r_D) (D/E)$.
- The **leverage irrelevance hypothesis** of MM is valid if the perfect market assumptions underlying their analysis are satisfied. The real world, however, is characterised by imperfections such as taxes (corporate and personal), bankruptcy costs, agency costs, and informational asymmetry.
- The value of a firm, when **corporate tax** is considered, is: $V = O (1 - t_c) / r + t_c D$.
- When **personal taxes** are considered, along with corporate taxes, the gain in value per rupee of debt is equal to:

$$\left[1 - \frac{(1 - t_c)(1 - t_{pe})}{(1 - t_{pd})} \right]$$

- The issue of optimal debt policy was answered in a novel, though controversial, manner by Merton Miller. He argued that while there is an optimal debt-equity ratio for the economy as a whole, no single firm can benefit by varying its own debt-equity ratio.



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- 19.5 If $t_c = 30$ percent, $t_{pe} = 10$ per cent and $t_{pd} = 15$ percent, 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

- 19.1 Mahima Limited has a net operating income of Rs. 30 million. Mahima employs Rs. 100 million of debt capital carrying 10 percent interest charge. The equity capitalisation rate applicable to Mahima is 15 percent. What is the market value of Mahima under the net income method? Assume there is no tax.
- 19.2 The following information is available for two firms, Box Corporation and Cox Corporation.

	Box	Cox
Net operating income	Rs. 2,000,000	Rs. 2,000,000
Interest on debt	Nil	500,000
Cost of equity	15%	15%
Cost of debt	10%	10%

Calculate the market value of equity, market value of debt, and market value of the firm for Box Corporation and Cox Corporation.

- (a) What is the average cost of capital for each of the firms?
 - (b) What happens to the average cost of capital of Box Corporation if it employs Rs. 30 million of debt to finance a project that yields an operating income of Rs. 4 million?
 - (c) What happens to the average cost of capital of Cox Corporation if it sells Rs. 10 million of additional equity (at par) to retire Rs. 10 million of outstanding debt?
- In answering the above questions assume that the net income approach applies and there are no taxes.
- 19.3 The management of Samata Company, subscribing to the net operating income approach, believes that its cost of debt and overall cost of capital will remain at 8 percent and 12 percent, respectively. If the equity shareholders of the firm demand a return of 20 percent, what should be the proportion of debt and equity in the firm's capital structure? Assume that there are no taxes.
- 19.4 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:



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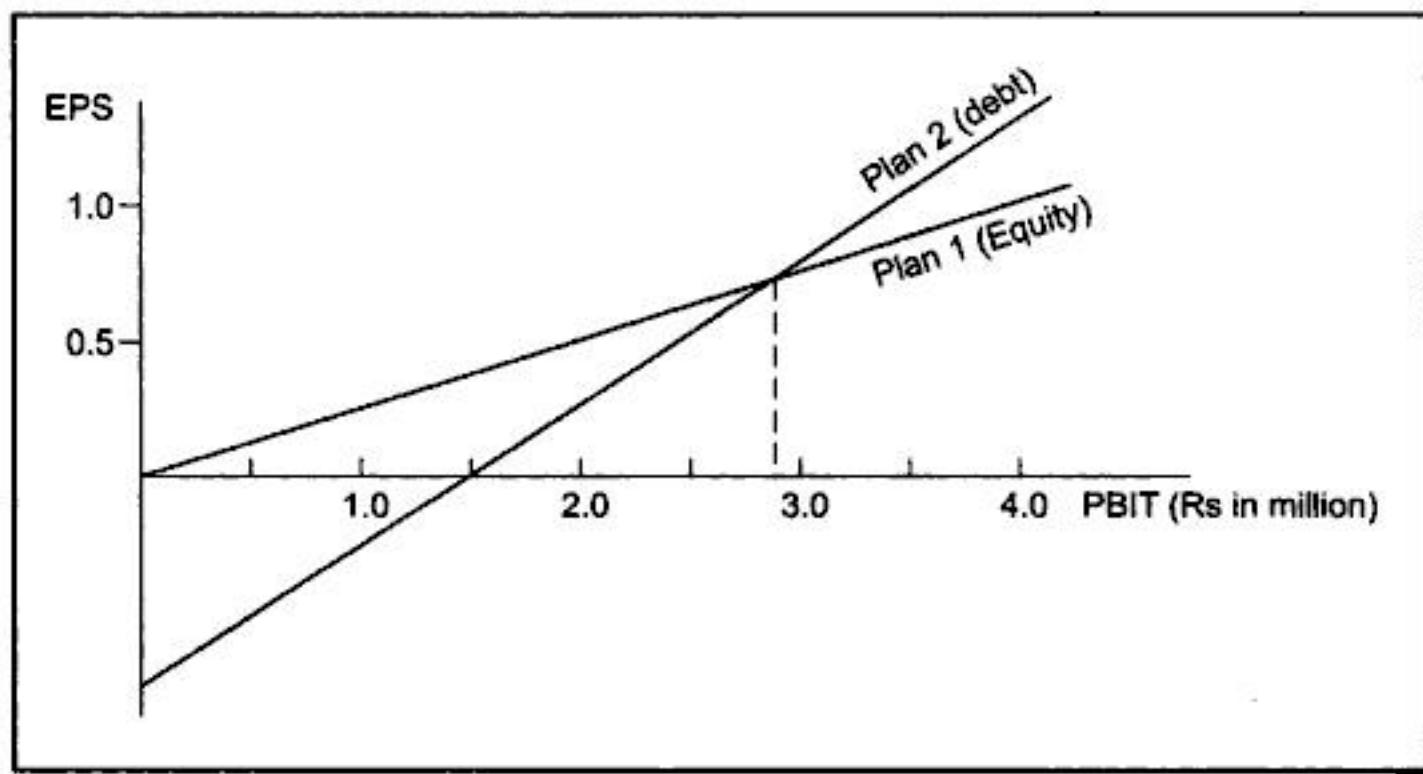
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alternatives and noting the point of intersection. This is shown in Exhibit 20.2 for the example of Falcon Limited. From this exhibit we find that the breakeven level of PBIT is Rs. 2.8 million. If PBIT is below Rs. 2.8 million equity financing is preferable to debenture financing; if PBIT is higher than Rs. 2.8 million, the opposite holds.

Exhibit 20.2 PBIT-EPS Chart



The PBIT indifference point between the two alternative plans can be obtained mathematically by solving the following equation for PBIT*

$$\frac{(PBIT^* - I_1)(1-t)}{n_1} = \frac{(PBIT^* - I_2)(1-t)}{n_2} \quad (20.2)$$

where PBIT* is the PBIT indifference point between the two alternative financing plans, I_1 and I_2 are the interest expenses before taxes under financing plans 1 and 2, t is the income-tax rate, and n_1 and n_2 are the number of equity shares outstanding under financing plans 1 and 2.

Applying the above equation to Falcon Limited example, we have:

$$\frac{(PBIT^* - 0)(0.5)}{2,000,000} = \frac{(PBIT^* - 1,400,000)(0.5)}{1,000,000}$$

Juggling a bit, we get:

$$\begin{aligned} 0.5 (PBIT^*) (1,000,000) &= 0.5 (PBIT^*) (2,000,000) - 0.5 (1,400,000) (2,000,000) \\ 500,000 PBIT^* &= 0.5 (1,400,000) (2,000,000) \\ PBIT^* &= 2,800,000 \end{aligned}$$

Thus, the indifference PBIT level, as anticipated, is the same as obtained graphically.

Risk Considerations So far we looked at the impact of alternative financing plans on EPS. What is the effect of leverage on risk? A precise answer to this question is not possible with the help of PBIT-EPS analysis. However, a broad indication may be obtained with reference to it.



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T = corporate income tax rate, PAT = profit after tax, D_p = preferred dividend, E_e = equity earnings, N = number of outstanding equity shares, and EPS = earnings per share.

Exhibit 20.6 Income Statement Format

Operating leverage	Sales Less: Variable costs Contribution Less: Fixed operating costs Profit before interest and tax Less: Interest on debt Profit before tax Less: Tax Profit after tax Less: Preferred dividend Equity earnings	}
Financial leverage	Total leverage	

Given these notations, let us now state certain relationships based on the income statement.

$$C = Q(P - V) \quad (20.4)$$

$$\text{PBIT} = Q(P - V) - F \quad (20.5)$$

$$\text{PBT} = \text{PBIT} - I \quad (20.5\text{A})$$

$$\text{PAT} = (\text{PBIT} - I)(1 - T) \quad (20.5\text{B})$$

$$\begin{aligned} \text{EPS} &= \frac{(\text{PBIT} - I)(1 - T) - D_p}{N} \\ &= \frac{[Q(P - V) - F - I](1 - T) - D_p}{N} \end{aligned} \quad (20.6)$$

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

	<i>Sales</i>	<i>Sales</i>
	500 units	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 percent increase in unit sales leads to a 100 percent increase in profit 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 percent decline in unit sales (from 500 units to 400 units) will lead to a 100 per cent fall in profit before income and tax (from Rs 50,000 to Rs 0). You may verify this yourself.



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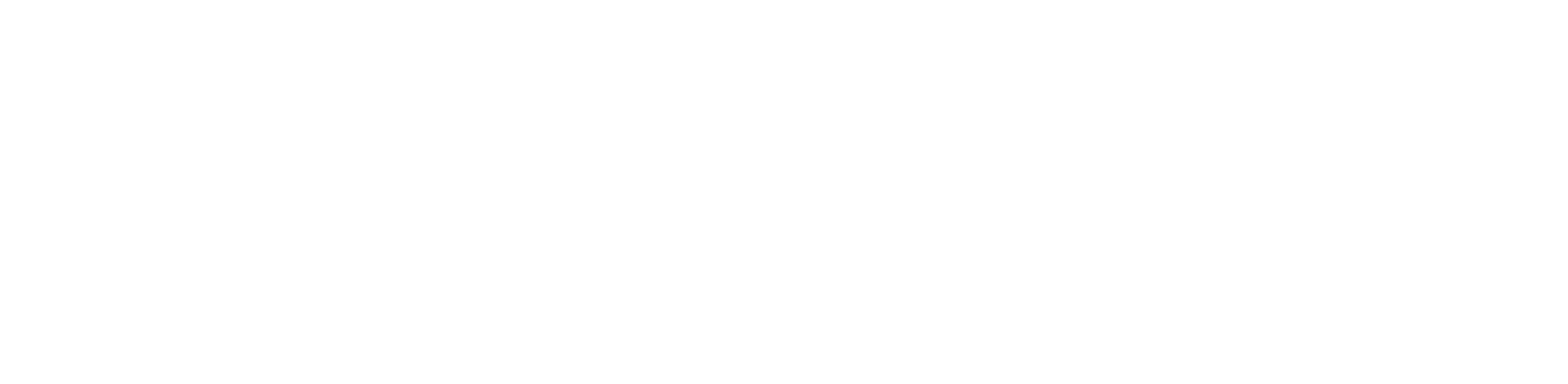
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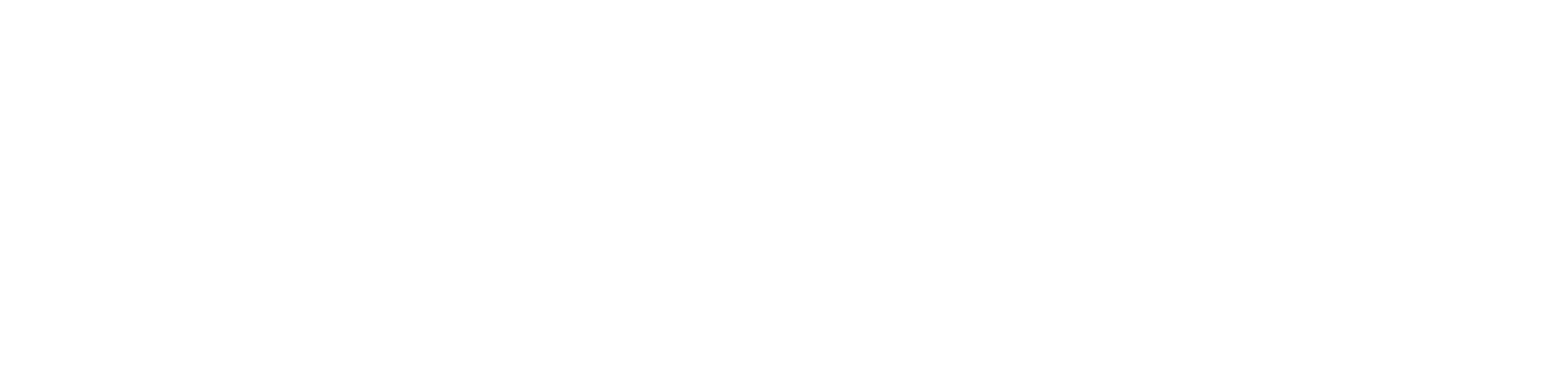
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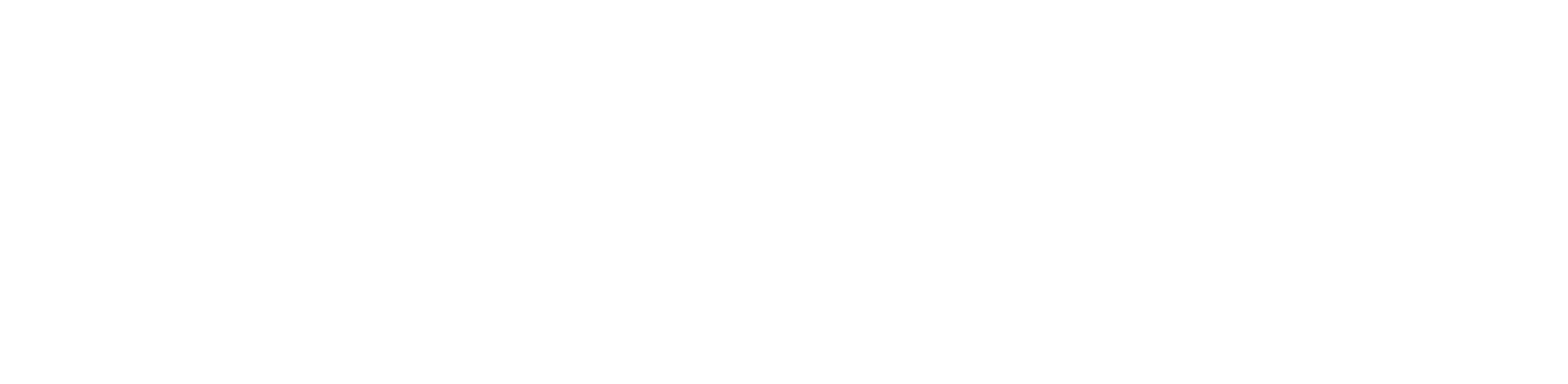
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Walter Model

James Walter¹ has proposed a model of 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:

- The firm is an all-equity financed entity. Further, it will rely only on retained earnings to finance its future investments. This means that the investment decision is dependent on the dividend decision.
- The rate of return on investments is constant.
- The firm has an infinite life

Valuation Formula Based on the above assumptions, Walter put forward the following valuation formula:

$$P = \frac{D + (E - D)r/k}{k} \quad (21.1)$$

where P is the price per equity share, D is the dividend per share, E is the earnings per share, $(E - D)$ is the retained earnings per share, r is the rate of return on investments, and k is the cost of capital.

As per Eq. (21.1), the price per share is a sum of two components:

$$\frac{D}{k} + \frac{(E - D)r/k}{k} \quad (21.2)$$

The first component is the present value of an infinite stream of dividends²; the second component is the present value of an infinite stream of returns from retained earnings.³

¹ James Walter, "Dividend Policy: Its Influence on the Value of the Firm," *Journal of Finance* (May, 1963)

² The present value of an infinite stream of D is :

$$\frac{D}{(1+k)} + \frac{D}{(1+k)^2} + \dots = D/k \quad (1)$$

³ The second component is derived as follows :

The return from the first retained earnings, $(E - D)$, would be :

Time	0	1	2	3	4
		$(E - D) r$	$(E - D) r$	$(E - D) r$	

(1)

(Note that the retained earnings at time 1 earns return from time 2 onwards)

The present value of this stream of returns is :

$$\frac{(E - D)r}{(1+k)^2} + \frac{(E - D)r}{(1+k)^3} + \dots = \frac{(E - D)r}{k(1+k)^2} \quad (2)$$

The return from the second retained earnings, $(E - D)$, would be :

Time	0	1	2	3	4	5
			$(E - D) r$	$(E - D) r$	$(E - D) r$	

(3)

The present value of this stream of returns is :

$$\frac{(E - D)r}{(1+k)^3} + \frac{(E - D)r}{(1+k)^4} + \dots = \frac{(E - D)r}{k(1+k)^2} \quad (4)$$

(Contd.)



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Their view is expressed quantitatively in the following valuation model advanced by them:

$$P = m(D + E/3) \quad (21.4)$$

where P is the market price per share, D is the dividend per share, E is the earnings per share, and m is 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. (21.4) in which E is replaced by $(D + R)$.

$$P = m\left(D + \frac{D + R}{3}\right) \quad (21.5)$$

The weights provided by Graham and Dodd are based on their subjective judgments 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.

Empirical Evidence

Advocates of the traditional position cite the results of cross-section regression analysis like the following:

$$\text{Price} = a + b \text{ Dividend} + c \text{ Retained Earnings} \quad (21.6)$$

Typically, in such a regression analysis the dividend coefficient, b , is much higher than the retained earnings coefficient, c . So the advocates of traditional position claim that their hypothesis is empirically vindicated.

However, a careful look at the above regression suggests that the conclusion reached by the traditionalists is unjustified for the following reasons:

1. Equation (21.6) is misspecified because, *inter alia*, it omits risk which is an important determinant of price. A better specified regression equation is:

$$\text{Price} = a + b \text{ Dividend} + c \text{ Retained Earnings} + d \text{ Risk} \quad (21.7)$$

In this equation b and c are expected to be positive whereas d is expected to be negative. Because risk and dividend are inversely correlated—the higher the level of risk the smaller the dividend and vice versa—the dividend variable in Eq. (21.6) will capture the effect of risk as well. Thus the omission of risk will impart an upward bias to b , the coefficient of dividend.

2. Measurement error distorts the results. It is well known that the measurement of earnings is almost invariably subject to error. The dividend figure, however, is given precisely. So the measurement error in earnings is fully transmitted to retained earnings which are simply earnings minus dividends. In regression analysis, when a variable (in our case, retained earnings) is subject to measurement error, its coefficient is biased downward.

To sum up, omission of risk imparts an upward bias to b , the coefficient of dividend and measurement error characterising retained earnings imparts a downward bias to c , the coefficient of retained earnings. Hence the claim of traditionalists that $b > c$ implies that a higher payout dividend payout ratio increases stock value cannot be vindicated.



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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.

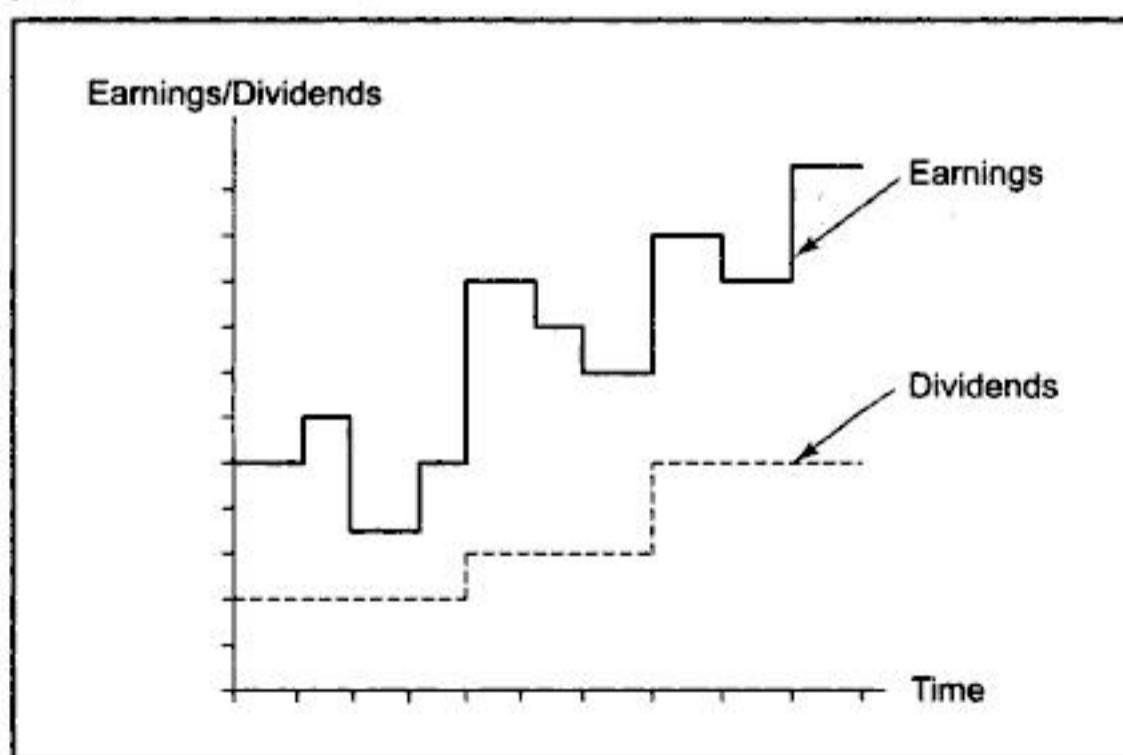
Taxes Presently dividend income is tax-exempt in the hands of investors. However, the firm distributing the dividend has to pay a dividend distribution tax of 16.995 percent (15.0 percent + surcharge + cess). Thus, there is an effective indirect tax of 16.995 percent on dividend income. As against this the long-term capital gains are tax exempt. Given this differential tax treatment, the tax factor *per se* favours a niggardly payout ratio.

Stability

Irrespective of the long-term 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. It is clear that such a policy results in transmission of the variability of earnings directly 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 22.1 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 22.1 Stable Dividends or Steadily Changing Dividends





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22.6 BONUS SHARES AND STOCK SPLITS

Bonus Shares

Bonus shares can be issued only out of free reserves built out of the genuine profits or share premium collected in cash only. Exhibit 22.3 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 exhibit shows the equity portion of the balance sheet after the bonus issue.

Exhibit 22.3 Effects of a Bonus Issue on the Equity Portion of the Balance Sheet

Part A : Equity Portion Before Bonus Issue

Paid-up Share Capital	Rs. 10,000,000
1,000,000 Shares of Rs.10 Each Fully Paid	
Reserves and Surplus	Rs. 30,000,000

Part B : Equity Portion After Bonus Issue in the Ratio 1 : 1

Paid-up Share Capital	Rs. 20,000,000
2,000,000 Shares of Rs.10 Each Fully Paid	
Reserves and Surplus	Rs. 20,000,000

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.

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? The important 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.



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Diversified	"We regard shareholders as partners. They deserve handsome returns. We give good dividends and periodic bonus issues."
Diversified	"We have a very conservative dividend policy. Our dividend rate which used to be 10 percent four years ago has now been raised to 15 percent. We won't probably consider a change for the next few years."
Truck	The company follows a conservative dividend policy which aims at protecting the interests of the shareholders and the company by (a) providing a consistent and reasonable return to the shareholders, and (b) ploughing back profits to take care of contingencies and to improve the equity base."
Pharmaceuticals	"We distribute about 30 percent of our earnings. We maintain our dividend around 18 percent. When the reserves position permits and the earnings potential justifies, we issue bonus shares."
Diversified	"We don't have a specific dividend policy. When the profits are good and liquidity satisfactory we give 12 percent to 15 percent as dividends."
Textiles	"Due to drop in profits we have skipped dividends. We will try to restore it—when I don't know."
Storage Batteries	"We have been paying steadily about 20 percent as dividends. Of course, our bonus record is poor. In the foreseeable future there may be very little change."
Diversified	"The investor is the king. Unless he is rewarded, we can't get the funds for our growth. So, we try to benefit him by dividends, bonus issues, and rights issue."
Consumer Electronics	"We paid good dividends as profits were high. We will try to maintain the same. Of course, profitability will be the key factor."
Diversified	"We have, if you permit me to say, an obsession with 20 percent dividend rate. We don't want to raise it to 25 or 30 percent as this connotes super profits—but we would like to declare bonus shares. Our planning revolves around this compelling goal—dominant goal."



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Foreign Exchange Risk If a bond has payments that are denominated in a foreign currency its rupee cash flows are uncertain. The risk that the foreign currency will depreciate in relation to the Indian rupee is referred to as the foreign exchange risk (or currency risk).

23.2 ■ RATING OF DEBT SECURITIES

Rating of the debt securities issued by companies, quasi-government organisations, and governments first originated in the US where presently there are at least five firms offering such services. In recent years, rating agencies have been set up in several other countries. In India, too, four rating agencies, viz. CRISIL, ICRA, and CARE, and Fitch have been set up. Some more agencies are in the pipeline.

Meaning of Debt Ratings To understand the meaning of debt ratings, consider some descriptions offered by well known rating agencies.

- Moody's* : "Ratings are designed exclusively for the purpose of grading bonds according to their investment qualities."¹
- Standard and Poor's* : "A Standard and Poor's corporate or municipal debt rating is a current assessment of the credit worthiness of an obligor with respect to specific obligation."²
- Australian Ratings* : "A corporate credit rating provides lenders with a simple system of gradation by which the relative capacities of companies to make timely repayment of interest and principal on a particular type of debt can be noted."³

Looking at the above descriptions we find that a debt rating essentially reflects the probability of timely payment of interest and principal by a borrower. The higher the debt rating, the greater the likelihood that the borrower will fulfill his obligation to pay the interest and principal.

Having described what a debt rating is we should also clarify what it is not.

- A debt rating is not a recommendation for purchasing, selling, or holding a security.
- A debt rating is not a general evaluation of the issuing organisation.
- A debt rating does not create a fiduciary relationship between the rating agency and the users of a rating since there is no legal basis for such a relationship.
- A debt rating does not imply that the rating agency performs an audit function.
- A debt rating is not a one-time evaluation of credit risk, which can be regarded as valid for the entire life of the security.

¹ Moody's Investor Service, *Moody's Bond Record*, New York: Moody's Investor Service, December 1984.

² Standard & Poor, *Credit Overview: Corporate and International Ratings*, New York: Standard & Poor's, 1984.

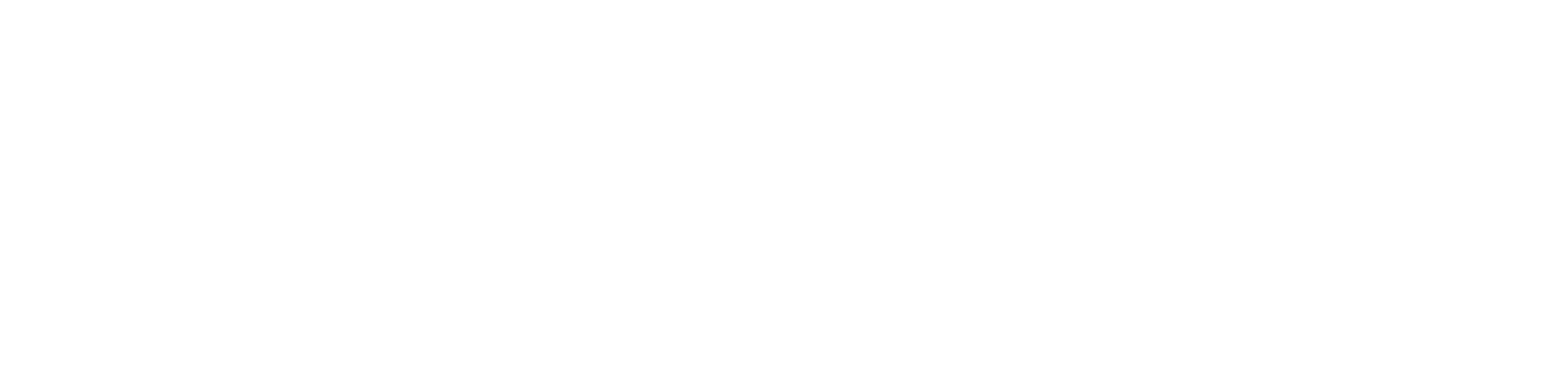
³ Australian Ratings, *An Introduction to Australian Ratings*, Melbourne : Australian Ratings, 1984.



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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 *prorata* 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 PTC holders are specified upfront.

Illustration⁵ 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 percent, subject to a cap of 10.65 percent (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 reschedulements 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 provides credit enhancement to the investors through the corporate undertaking provided by HDFC to the extent of 10.785 percent of the initial future cash flows (around Rs. 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. His principal tasks are to:

- Bring the originators and the investors together.

⁵ This illustration is adapted from *Rating Profile*, April 2003 published by ICRA Rating Services.



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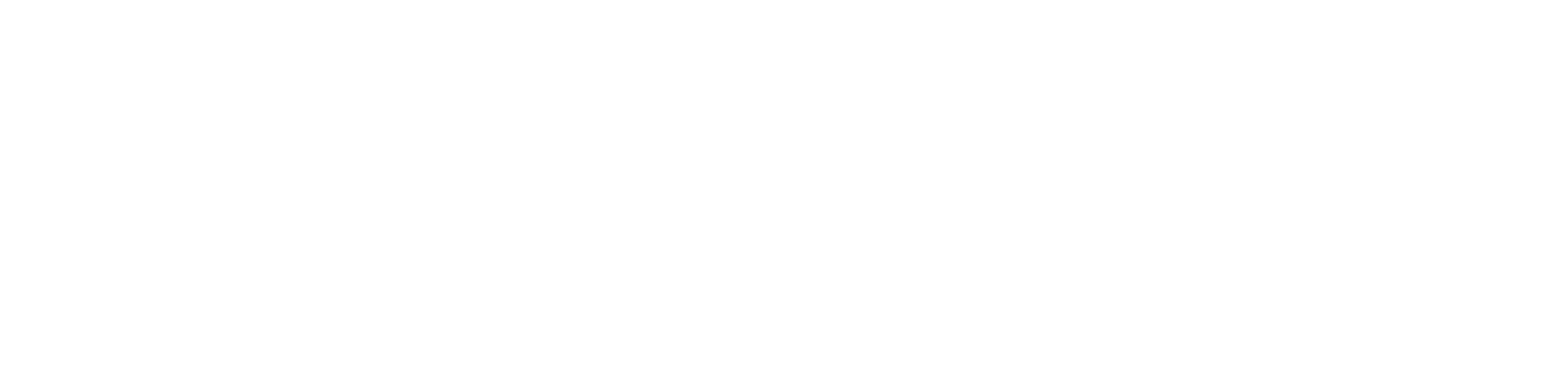
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24.3 ■ MECHANICS OF LEASING

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
- Sales tax provisions relating to leasing
- Procedural aspects of leasing
- Income tax provisions relating to leasing
- Accounting treatment of leases

Legal Aspects of Leasing As there is no separate statute for equipment leasing in India², 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 off 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). This, in essence, has 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:

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.

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.



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current price. These explanations have a "free lunch" flavour and do not appear, on closer examination, to be convincing. Let us see why.

Cheaper Debt The interest rate on convertible debentures or debentures with warrants is typically lower than that on straight debentures. For example the interest rate on the convertible debentures of Videocon Narmada Electronics Limited issued in 1992 was 10 percent when the prevailing yield on straight debentures was 17 per cent and upward. This may persuade some to believe that convertible debentures and warrants enable companies to issue debt cheaply. You should be suspicious of such an argument as it has a "free lunch" flavour.

When a company issues convertible debentures or debentures with warrants, it is providing investors a combination of a straight debt instrument and a call option on the equity shares of the firm. We know that a call option typically has a positive value and in no case can it have a negative value. As investors enjoy the call option when they buy convertible debentures or debentures with warrants, they are willing to accept a lower interest rate.

A convertible debenture or a debenture with warrants may be regarded as a means of raising cheap debt finance only if investors over-value the call option embedded in them. In an efficient market it is unlikely that investors would do so.

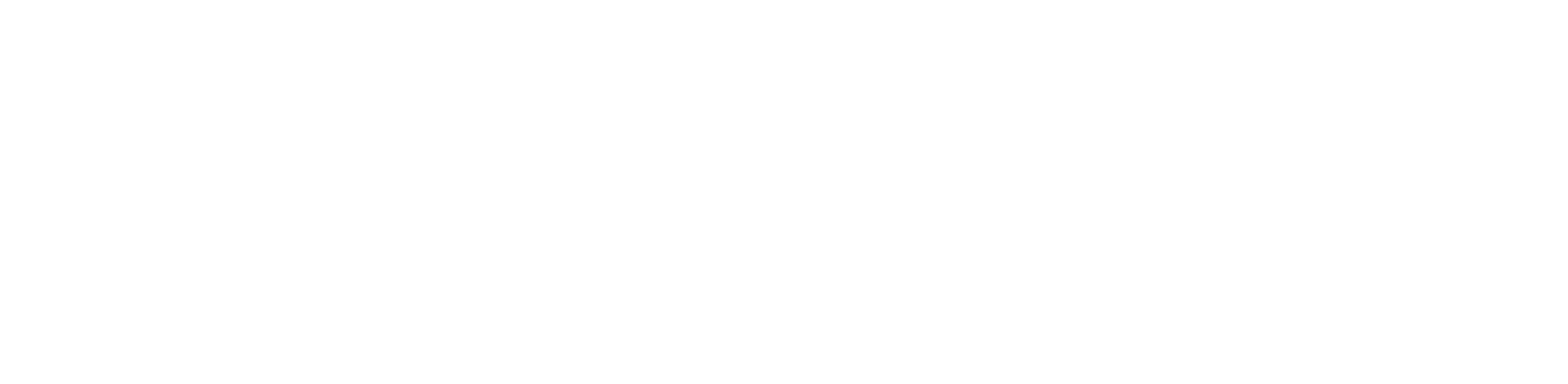
Equity at a Premium The conversion price associated with a convertible debenture or the subscription price for exercising the warrant is typically higher than the price at which the equity stock can be currently issued. Hence, many finance executives believe that convertible debentures or debentures with warrants enable a company to issue equity at a premium. This argument, too, is flawed.

Remember that investors will choose the conversion option (or exercise the warrants) only when it is advantageous for them. Suppose, for example, the current share price of a company is Rs. 20 (and assume, for the sake of simplicity, that the company can issue shares at Rs. 20) and the company issues convertible debentures for Rs. 100 (the face value too is Rs. 100) that can be converted into 4 equity shares at a conversion price of Rs. 25 at the option of the holder a year from now. If the equity share price a year from now happens to be, say, Rs. 30, the holders of convertible debentures will exercise the conversion option. In such a case the firm loses because what is worth Rs. 30 has to be issued at Rs. 25. Hence, while the issue price is certainly higher than the current price of Rs. 20, it is clearly lower than the future price of Rs. 30.

What happens if the share price a year from now turns out to be less than Rs. 25, the conversion price? In this case the holders of convertible debentures will not exercise the conversion option. So the company is not assured of an issue price of Rs. 25 in future. Hence, the convertible debenture is not a reliable means of issuing equity shares at a premium.

Modern Finance Explanations

The preceding discussion suggests that the conventional explanations for the popularity of convertible debentures and debentures with warrants are flawed. Can we find a better



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This chapter is concerned with certain aspects and considerations relating to overall working capital management. It is divided into six sections:

- Characteristics of current assets
- Factors influencing working capital requirements
- Level of current assets
- Current assets financing policy
- Operating cycle analysis
- Cash requirement for working capital

26.1 ■ CHARACTERISTICS OF CURRENT ASSETS

While managing working capital, bear in mind two characteristics of current assets: (i) short life span, and (ii) swift transformation into other asset forms.

Exhibit 26.1 Constituents of Current Assets and Current Liabilities

Part A : Current Assets

Inventories

 Raw Materials and Components

 Work-in-Process

 Finished Goods

 Others

Trade Debtors

Loans and Advances

Cash and Bank Balances

Part B: Current Liabilities

Sundry Creditors

Trade Advances

Borrowings (short-term)

 Commercial Banks

 Others

Provisions

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 60 days, and inventories may be held for 1 to 60 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 26.2 shows the cycle of transformation.

The short life span of working capital components and their swift transformation from one form into another has certain implications.



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Exhibit 26.7 Financial Information for Horizon Limited

		Balance Sheet Data		
Profit & Loss Account Data		Beginning of 19X0	End of 19X0	
Sales	800	Inventory	96	102
Cost of goods sold	720	Accounts receivable	86	90
		Accounts payable	56	60

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 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 it 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.

26.6 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 sundry debtors (receivables) is shown to be Rs. 10 million on the balance sheet. If the profit margin is 25 percent and the depreciation element in the cost of goods sold corresponding to sundry debtors is Rs. 0.5 million, the cash cost of sundry debtors is obtained as follows:



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PROBLEMS

- 26.1 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?

- 26.2 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?

- 26.3 The following annual figures related to XYZ Co.

	Rs.
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 incurred	240,000
Sales promotion expenses, paid quarterly in advance	120,000

The company sells its products on gross profit of 25 percent 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 Rs. 100,000.

Assuming a 20% safety margin, work out the working capital requirements of the company on cash cost basis. Ignore work-in-process.





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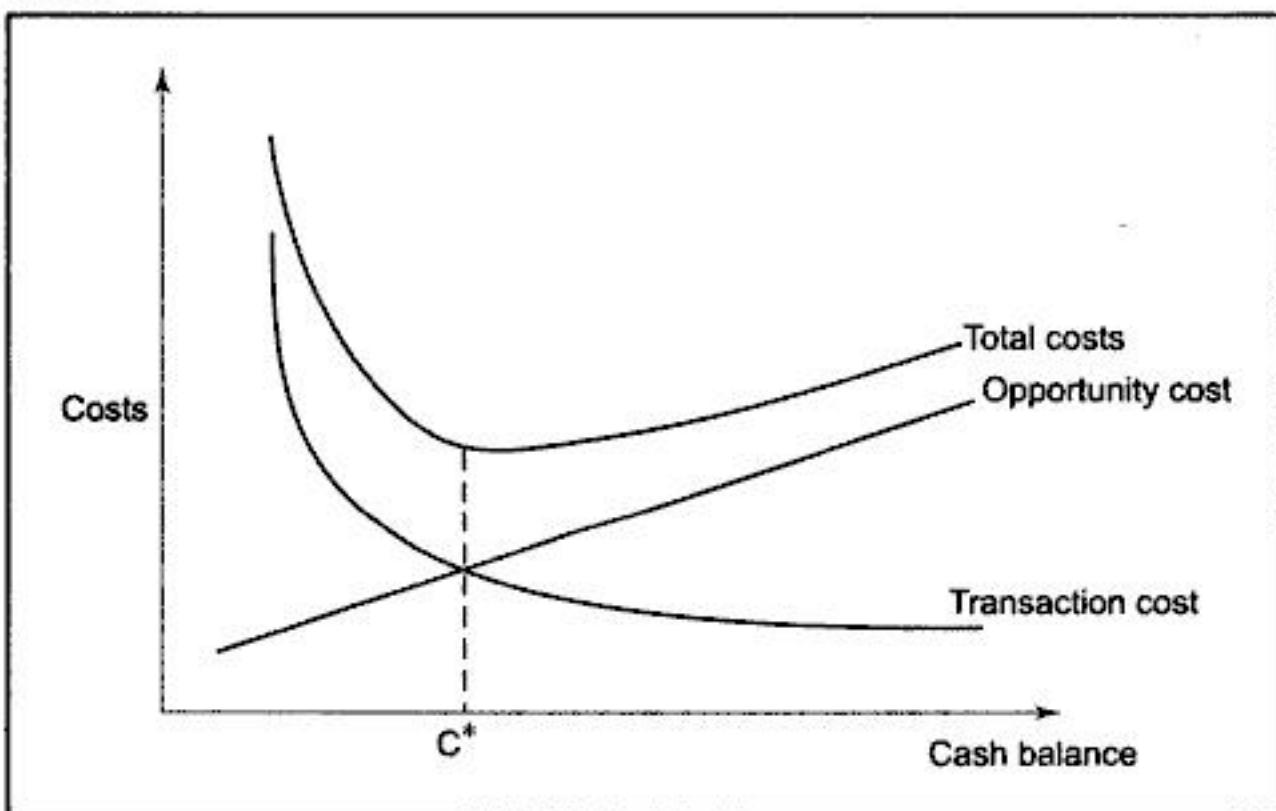
and funds between transacting parties. FEDI leads to elimination of paper invoices, paper cheques, mailing, handling, and so on. Under FEDI, the seller sends the bill electronically to the buyer, the buyer electronically authorises its bank to make payment, and the bank transfers funds electronically to the account of the seller at a designated bank. The net effect is that the time required to complete a business transaction is shortened considerably thereby virtually eliminating the float.

Currently one of the drawbacks of FEDI is that it is expensive and complex to set up, more so in a country like India. Further, many parties may not be ready or willing to participate in it. However, with the advancements in technology and the growth of internet, e-commerce costs will fall significantly. This will induce more parties to participate in FEDI. As Ross Westerfield and Jordan say: "As the use of FEDI increases (which it will), float management will evolve to focus much more on issues surrounding computerised information exchange and funds transfer."

27.5 ■ 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 27.6 presents graphically the tradeoffs between the trading costs and opportunity costs. As shown in this figure, the total costs of holding cash (which consist of trading costs and opportunity costs) are at a minimum when the size of cash balance is C^* . This represents the optimal cash.

Exhibit 27.6 Optimal Cash Balance





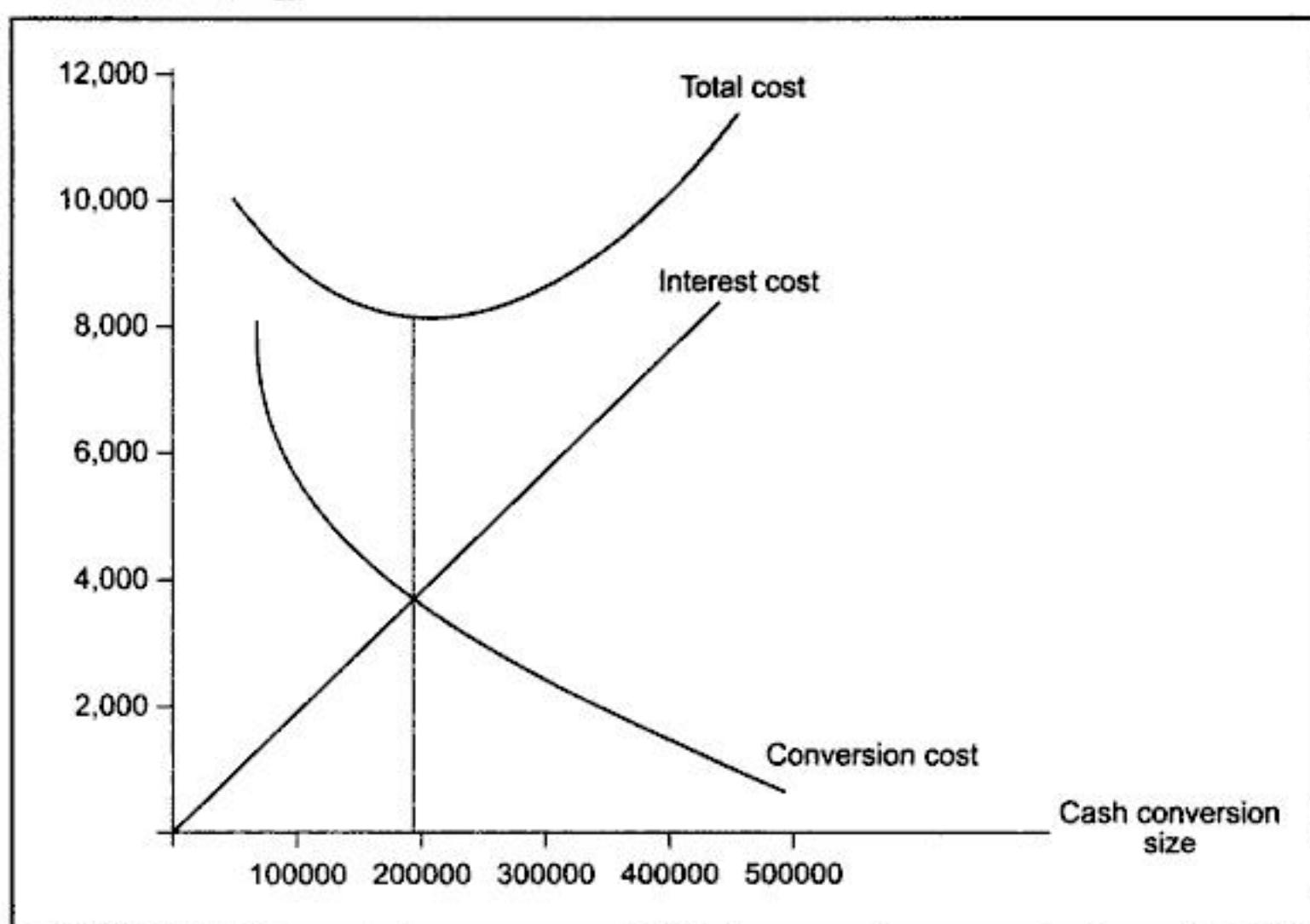
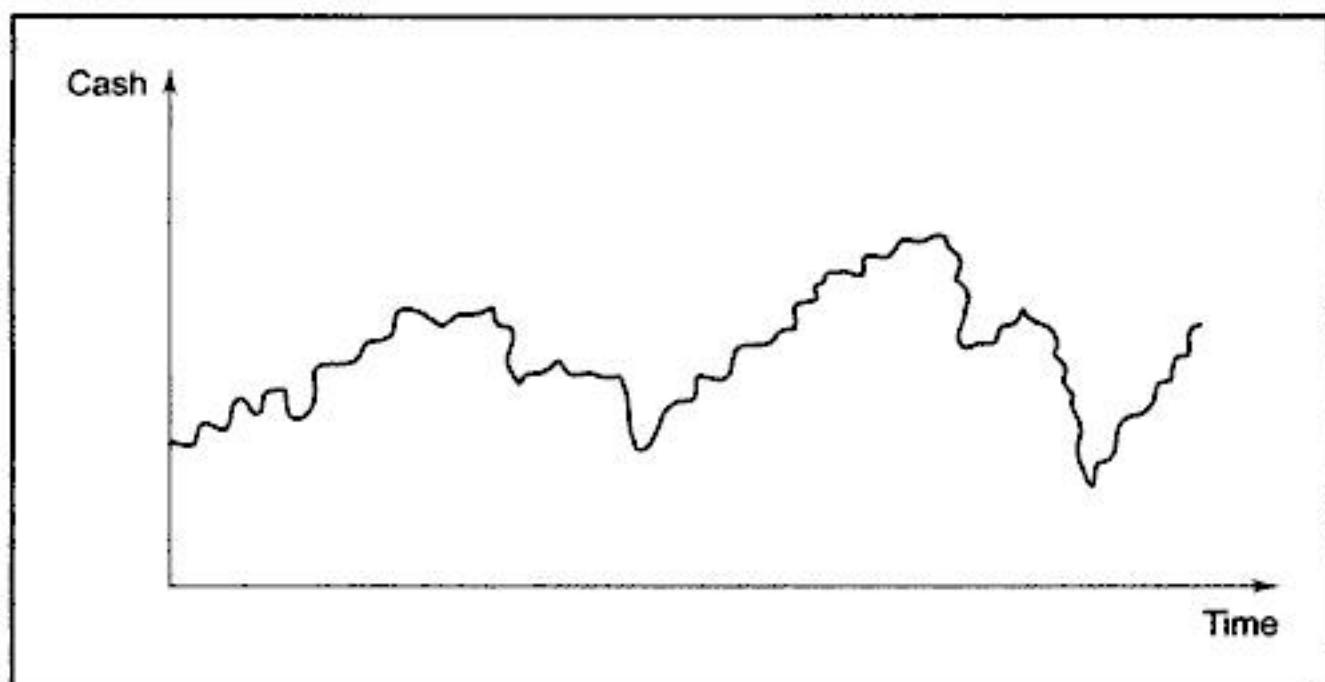
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Exhibit 27.9 Graphic Solution to the Baumol Model**Exhibit 27.10 Changes in Cash Balance**

According to the Miller and Orr model, upward changes in cash balance are allowed till the cash balance reaches an "upper control limit" (UL), as shown in Exhibit 27.11. As this level is attained the cash balance is reduced to a "return point" (RP) by investing $UL - RP$ in marketable securities. On the other hand, downward changes are permitted only till the cash balance touches a "lower control limit" (LL), as shown in Exhibit 27.11. Once this level is reached, enough marketable securities are disposed to restore the cash balance to its "return point" (RP).



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Traditional Credit Analysis The traditional approach to credit analysis calls for assessing a prospective customer in terms of the "five C's of credit".

<i>Character</i>	The willingness of the customer to honour his obligations. It reflects integrity, a moral attribute that is considered very important by credit managers.
<i>Capacity</i>	The ability of the customer to meet credit obligations from the operating cash flows.
<i>Capital</i>	The financial reserves of the customer. If the customer has problems in meeting credit obligations from operating cash flow, the focus shifts to its capital.
<i>Collateral</i>	The security offered by the customer in the form of pledged assets.
<i>Conditions</i>	The general economic conditions that affect the customer.

To get information on the five C's, 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' 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 28.1 shows a logic that the credit analyst may employ to process credit-related information. For the sake of simplicity, only three C's, 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').

Sequential Credit Analysis The full logic of Exhibit 28.1 may be redundant for certain customers. For example, if the character of a customer is found weak, it may be pointless to conduct the credit investigation further. Hence, sequential credit analysis is a more efficient method. In this analysis, investigation is carried further if the benefit of such analysis outweighs its cost. To illustrate, consider three stages of credit analysis: review of the past payment record, detailed internal analysis, and credit investigation by an external



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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:

$$12,000,000 = (10) \frac{27,000,000}{360} + (\text{ACP on non-discount sales}) \frac{63,000,000}{360}$$

Hence,

$$\text{ACP on non-discount sales} = \frac{12,000,000 - (10) \frac{27,000,000}{360}}{\frac{63,000,000}{360}} = 64.3 \text{ days}$$

28.6 The following information is available for Avinash Company:

	Month	Sales (Rs in million)	End-of-quarter Receivables (Rs 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 outstanding (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 0–31, 31–60, and 61–90 days.

Solution

- (a) The DSO is as shown below:

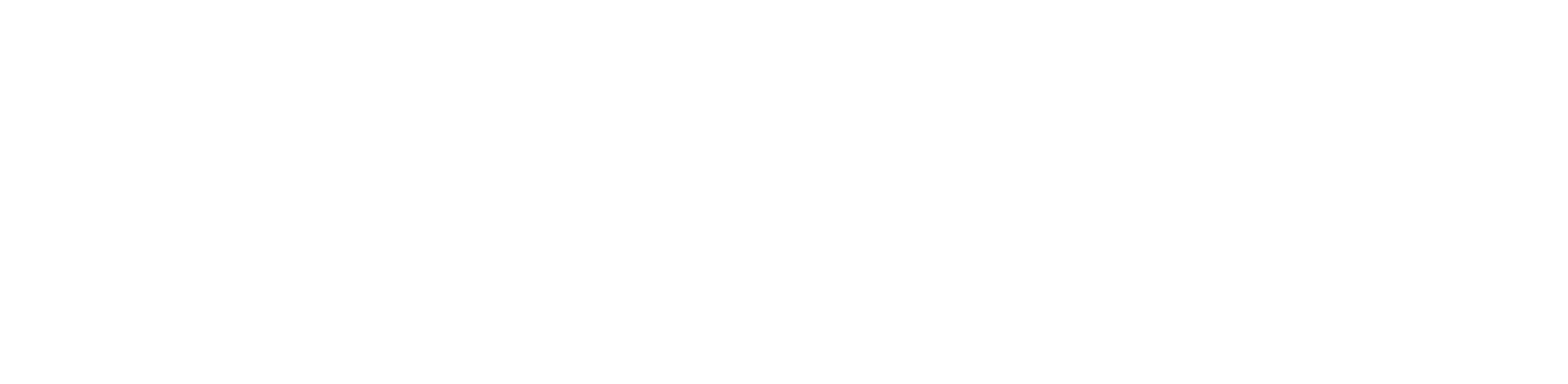
	End of Quarter I	End of Quarter II	End of Quarter III
A. Receivables	Rs 63 million	Rs 48 million	Rs 54 million
B. Daily sales (30 days averaging)	$60/30 = \text{Rs } 2 \text{ million}$	$40/30 = \text{Rs } 1.333 \text{ million}$	$50/30 = \text{Rs } 1.667 \text{ million}$
C. DSO (30 days averaging) = A/B	31.5 days	36 days	32.4 days
D. Daily sales (60 days averaging)	$110/60 = \text{Rs } 1.833 \text{ million}$	$90/60 = \text{Rs } 1.5 \text{ million}$	$100/60 = \text{Rs } 1.667 \text{ million}$
E. DSO (60 days averaging) = A/D	34.4 days	32 days	32.4 days



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C = percent carrying cost

P = price per unit

T = total costs of ordering and carrying

Given the above assumptions and symbols, the total costs of ordering and carrying inventories are equal to :

$$T = \frac{U}{Q} \times F + \frac{Q}{2} \times P \times C \quad (29.1)$$

In Eq. (29.1), 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 29.1 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. The total cost of ordering and carrying is minimised when

$$Q = \sqrt{\frac{2FU}{PC}} \quad (29.2)^4$$

The formula embodied in Eq. (29.2) 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	= Rs. 2,000
P = purchase price per unit	= Rs. 12
C = carrying cost	= 25 percent of inventory value.

Plugging in these values in Eq. (29.2), we get

$$Q = \sqrt{\frac{2 \times 2,000 \times 20,000}{12 \times 0.25}} = 5,164$$

⁴ To obtain Eq. (29.2) we use the following steps :

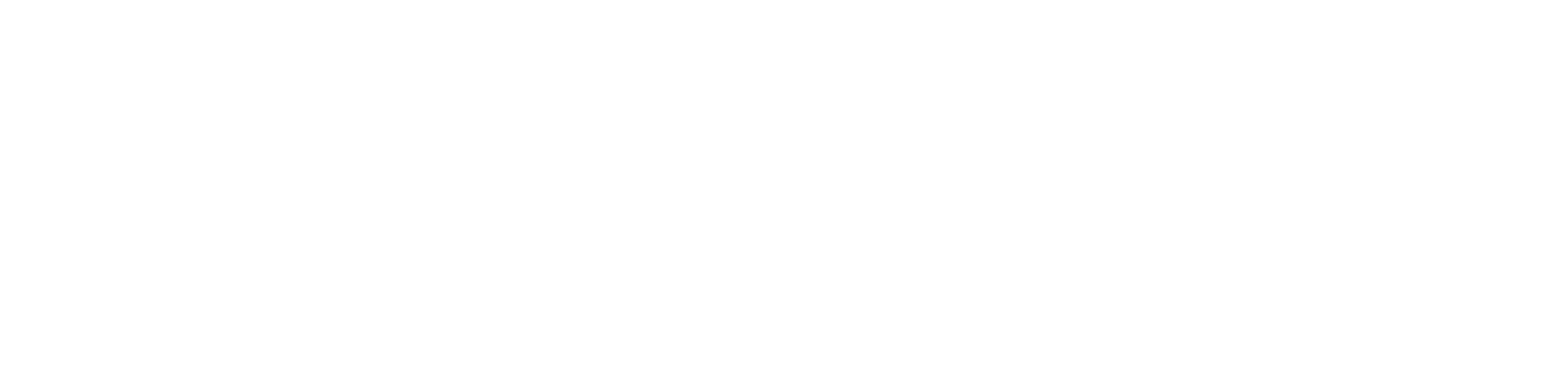
$$\frac{dT}{dQ} = -\frac{UF}{Q^2} + \frac{PC}{2} = 0 \quad (1)$$

$$-2UF + Q^2 PC = 0 \quad (2)$$

$$Q^2 PC = 2UF \quad (3)$$

$$Q^2 = \frac{2UF}{PC} \quad (4)$$

$$Q = \sqrt{\frac{2UF}{PC}} \quad (5)$$



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SOLVED PROBLEMS

30.1 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) $\frac{0.01}{0.99} \times \frac{360}{30 - 10} = 18.2\%$

30.2 Consider the data for Amit & Co.

<i>Current Assets</i>	<i>Rs. in million</i>
Inventories	70
Debtors	60
Cash	15
Others	<u>145</u>
 <i>Current Liabilities</i>	
Trade creditors	40
Provisions	<u>20</u>
	<u>60</u>

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 Rs. 60 million.

Solution

$$\begin{aligned}\text{MPBF} &= 0.75(\text{CA}) - \text{CL} \\ &= 0.75(145) - 60 = \text{Rs. } 48.75 \text{ million}\end{aligned}$$

PROBLEMS

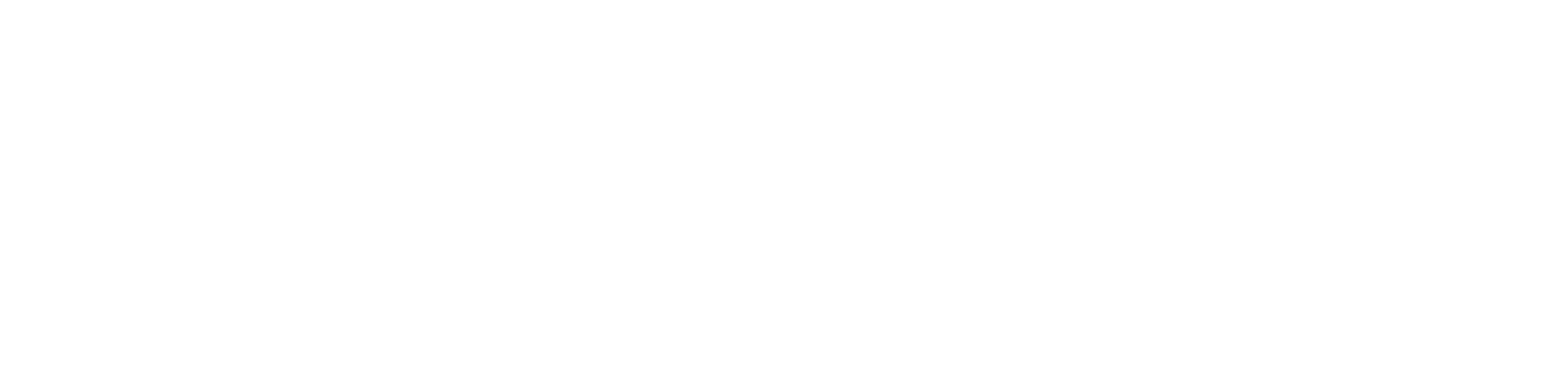
30.1 What is the annual percentage interest cost associated with the following credit terms?

- (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.



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4. Explain what is a classification (confusion) matrix.
5. What is Materials Requirement Planning?
6. What is the Just-in-Time system?
7. What is Electronic Data Interchange and Bar Coding systems?
8. Discuss the concept and formula for working capital leverage.

SOLVED PROBLEMS

- 31.1 Prabhu Enterprises seeks your help in classifying the credit applicants of the company into 'good' and 'bad' categories. You believe that the two key ratios that are helpful in discriminating between the 'good' and 'bad' accounts are (i) the quick ratio [(Current assets – Inventories)/Current liabilities], represented hereafter by the variable X and (ii) the earning power [Profit before interest and tax/Total assets], represented hereafter by the variable Y. The following data is given to you about 18 accounts, ten of which happen to be good and eight of which happen to be bad.

Good Accounts			Bad Accounts		
Number	X	Y	Number	X	Y
1	0.80	18%	11	0.60	8%
2	1.00	15	12	0.75	11
3	1.20	20	13	0.70	19
4	0.75	12	14	0.65	10
5	0.65	16	15	0.80	12
6	1.10	9	16	0.70	4
7	0.85	22	17	0.55	9
8	0.65	19	18	0.65	-9
9	0.95	15			
10	1.05	24			

Estimate the discriminant function that best discriminates between the 'good' and the 'bad' applicants

Solution

The discriminant function is

$$Z_i = a X_i + b Y_i$$

$$a = \frac{\sigma_y^2 \cdot dx - \sigma_{xy} \cdot dy}{\sigma_x^2 \cdot \sigma_y^2 - \sigma_{xy} \cdot \sigma_{yx}}$$

$$b = \frac{\sigma_x^2 \cdot dy - \sigma_{xy} \cdot dx}{\sigma_x^2 \cdot \sigma_y^2 - \sigma_{xy} \cdot \sigma_{yx}}$$

Drawing on the information in the following table, we find that



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assets are financial securities, excess land, and infrequently used buildings. These assets are valued at their fair market value.

Adjusting Book Values to Reflect Liquidation Values The most direct approach for approximating the fair market value of the assets on the balance sheet of a firm is to find out what they would fetch if the firm were liquidated immediately. If there is an active secondary market for the assets, liquidation values equal secondary market prices. However, active secondary markets do not exist for many business assets. In such cases, the appraiser must try to estimate the hypothetical price at which the assets may be sold.

The principal weakness of the liquidation value approach is that it ignores organisational capital. Instead of valuing the firm as a going concern, it values it as a collection of assets to be sold individually. This approach makes sense only for a firm that is worth more dead than alive.

The Bottom Line The unadjusted book value approach makes sense only in rare cases, such as the appraisal of regulated industries. The adjusted book value approach—replacement cost approach or liquidation value approach—makes sense for firms which derive their value mainly from owning natural resources. Even such situations are not common because most firms have valuable organisational capital. Thus, in most real life situations, the book value approach has limited applicability.

32.2 ■ STOCK AND DEBT APPROACH

When the securities of a firm are publicly traded its value can be obtained by merely adding the market value of all its outstanding securities. This simple approach is called the stock and debt approach by property tax appraisers. It is also referred to as the market approach.

The valuation of Horizon Limited provides an example of stock and debt approach. On March 31, 20X1, the firm had 15 million outstanding shares. At the closing price of Rs. 20 on that day, Horizon's equity had a market value of Rs. 300 million. On March 31, 20X1 the firm also had outstanding debt with a market value of Rs. 210 million. Adding the market value of the equity to the market value of debt gives a total firm value of Rs. 510 million for Horizon as on March 31, 20X1.

Though the stock and debt approach is fairly straightforward, there is some debate about what prices to use when valuing the securities, particularly the equity shares. Since stock prices are volatile, some appraisers suggest using an average of recent stock prices, rather than the price on the lien date (the day on which the appraiser is attempting to value is called the lien date). Their argument is that the average of prices over a period of time, rather than the current stock price, is a more reliable estimate of the firm's true underlying value.

Is averaging a reasonable procedure? The answer depends on whether or not the stock market is efficient. If the market is considered to be efficient, implying that security prices reflect all publicly available information, there is no justification for averaging.



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capital consists of net fixed assets deployed in the operations of the firm plus the operating working capital (operating working assets minus non-interest bearing current liabilities). In practice, operating invested capital may be obtained as follows:

- Total assets in the balance sheet
- Non-operating fixed assets like surplus land
- Excess cash and marketable securities¹

If we assume that the investment figures of 20 and 25 in the balance sheet of Matrix Limited at the end of years 2 and 3 represent excess cash and marketable securities, the operating invested capital at the end of years 1, 2, and 3 for Matrix Limited is:

	1	2	3
Operating invested capital	200	238	260

NOPLAT NOPLAT stands for net operating profit less adjusted taxes. It is equal to:
EBIT – Taxes on EBIT

EBIT is the pre-tax operating income the firm would have earned if it had no debt. While calculating EBIT, the following are excluded: interest expenses, interest income, and non-operating income (or loss)

Taxes on EBIT represents the taxes the firm would pay if it had no debt, excess marketable securities, or non-operating income (or loss). Taxes on EBIT can be calculated by adjusting the income tax provision for the income tax attributable to interest expense, interest and dividend income from excess marketable securities and, non-operating income (or loss).

The calculation of NOPLAT for Matrix Limited is shown below

	Year 1	Year 2	Year 3
Profit before tax	26	30	36
+ Interest expense	12	15	16
- Interest income	—	—	3
- Non-operating income	—	—	8
= EBIT	38	45	41
Tax provision from income statement	8	9	12
+ Tax shield on interest expense	4.8	6	6.4
- Tax on interest income	—	—	1.2
- Tax on non-operating income	—	—	3.2
= Taxes on EBIT	12.8	15	14.0
NOPLAT	25.2	30	27.0

¹ This represents cash and marketable securities in excess of the operational needs of the firm.



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Given the above information, the forecasted FCF during the high growth period are calculated in Exhibit 32.9.

Exhibit 32.9 Forecasted FCF: Exotica Corporation

	1	2	3	4	5	Rs in million Terminal year
1. Revenues	4400	4840	5324	5856.4	6442.0	6828.6
2. EBIT	550	605	665.6	732.1	805.1	—
3. EBIT(1 - t)	330	363	399.3	493.2	483.2	512.1
4. Cap exp	110	121	131.1	146.4	161.1	—
-Depreciation						
5. Δ Working capital	120	132	145.2	159.7	175.7	116.0
6. FCF (B-C-D)	100	110	121	133.1	146.4	396.1

The cost of equity (r_E), using the capital asset pricing model, and the weighted average cost of capital (WACC) during the high growth period and stable growth period are calculated below:

	$r_E = \text{Risk-free rate} + \text{Equity beta}$ (Market risk premium)	$\text{WACC} = w_E r_E + w_D r_D (1-t)$
High growth period	$13\% + 1.333(6\%)$ $= 21\%$	$0.5(21\%) + 0.5(15\%)(0.6)$ $= 15\%$
Stable growth period	$12\% + 1.000(7\%)$ $= 19\%$	$0.6(19\%) + 0.4(15\%)(0.6)$ $= 15\%$

The present value of the FCF during the explicit forecast period is:

$$= \frac{100}{(1.15)} + \frac{110}{(1.15)^2} + \frac{121}{(1.15)^3} + \frac{131.1}{(1.15)^4} + \frac{146.4}{(1.15)^5} = \text{Rs. } 397.44 \text{ million}$$

The present value of the terminal value is :

$$= \frac{396.1}{0.15 - 0.06} \times \frac{1}{(1.15)^5} = \text{Rs. } 2188.23 \text{ million}$$

The value of the firm is:

$$= 397.44 + 2188.23 = \text{Rs. } 2585.67 \text{ million}$$

Three Stage Growth Model The three-stage growth model assumes that:

- The firm will enjoy a high growth rate for a certain period (usually 3 to 7 years).
- The high growth period will be followed by a transition period during which the growth rate will decline in linear increments.
- The transition period will be followed by a stable growth rate forever.

Hence the value of the firm is expressed as follows:

Value of the firm = PV of FCF during the high growth period + PV of FCF during the transition period + PV of terminal value



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Free Cash Flow Forecast Based on the information provided above, the forecast for revenues and operating expenses is developed in the first three panels of the table below. Finally the free cash flow forecast is developed in the last panel of the table. The schedule for current assets, fixed assets, and depreciation is shown in next table.

Financial Projections							
Year	PANEL I						
	1	2	3	4	5	6	7
A. Rooms	2280	2410	2490	2620	2806	3161	3311
B. Occupancy rate	0.60	0.61	0.62	0.63	0.64	0.65	0.66
C. Average room rent (in rupees)	2500	2875	3306	3802	4373	5028	5783
PANEL II*							
D. Room rent from owned properties	1248	1543	1863	2291	2867	3771	4613
E. Food & beverage rev	811	1003	1211	1489	1864	2451	2998
F. Revenue from owned properties (D + E)	2059	2546	3074	3780	4731	6222	7611
G. Management fees from managed properties	87	108	130	160	200	264	323
H. Total revenues (F + G)	2146	2654	3204	3940	4931	6486	7934
PANEL III*							
Year	1	2	3	4	5	6	7
I. Material expenses	309	382	461	567	710	933	1142
J. Personnel expenses	309	382	461	567	710	933	1142
K. Upkeep and service expenses	371	458	553	680	852	1120	1370
L. Sales and general admn expenses	371	458	553	680	852	1120	1370
M. Total operating expenses	1360	1680	2028	2494	3124	4106	5024
PANEL IV*							
N. EBDIT (H - M)	786	974	1176	1446	1807	2380	2910
O. Depreciation	120	132	140	166	210	293	329
P. EBIT	666	842	1036	1280	1597	2087	2581
Q. NOPLAT	533	674	829	1024	1278	1670	2065
R. Gross cash flow	653	806	969	1190	1488	1963	2394
S. Gross Investment (Fixed assets) + (Current assets)	302	446	398	712	1085	1848	1216
T. Free cash flow (R-S)	351	360	571	478	403	115	1178
U. Non-operating cash flow		300			600	800	
V. Cash flow to investors (T + U)	351	660	571	478	1033	915	1178

* All figures in million rupees



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33.1 METHODS AND KEY PREMISES OF VBM

Several methods have been used in VBM. The three principal methods of VBM are:

- The free cash flow method proposed by McKinsey and LEK/Alcar group.
- The economic value added/market value added (EVA/MVA) method pioneered by Stern Stewart and Company.
- The cash flow return on investment/cash value added (CFROI/CVA) method developed by BCG and Holt Value Associates.

Common Premises Though these methods look outwardly different, the basic premises underlying them are the same. They are as follows:

- The value of any company (or its individual strategies and investments) is equal to the present value of the future cash flows the company is expected to produce.
- Conventional accounting earnings are not a sufficient indicator of value creation because they are not the same as cash flow, they do not reflect risk, they do not include an opportunity cost of capital, they do not consider time value of money, and they are not calculated the same way by all firms because of variations in accounting policy.
- For managing shareholder value, firms should use metrics that are linked to value creation and employ them consistently in all facets of financial management.
- A well designed performance measurement and incentive compensation system is essential to motivate employees to focus their attention on creating shareholder value.

Key Difference The key difference between these methods relates to VBM metrics. For example, the LEK/Alcar method uses shareholder value added (SVA), the Stern Stewart method emphasises EVA and MVA, and the BCG method focuses on CFROI and CVA.

Each camp argues that its measures are the best and cites supporting evidence for the same. It is difficult to objectively assess the validity of these claims.

While the different methods to VBM have their own fan clubs, the EVA/MVA method seems to have received more attention and gained more popularity.

33.2 MARAKON APPROACH

Marakon Associates, an international management consulting firm founded in 1978, has done pioneering work in the area of value based management. The Marakon approach has been comprehensively described in the book *The Value Imperative* authored by James M. McTaggart, Peter W. Kontes, and Michael C. Mankins.¹

The key steps in the Marakon approach are as follows:

- Specify the financial determinants of value
- Understand the strategic drivers of value
- Formulate higher value strategies
- Develop superior organisational capabilities

¹ Published by Free Press, New York in 1994.



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- A corporate governance mechanism that promotes the highest degree of accountability for creation or destruction of value.
- A top management compensation plan which is guided by the principle of "relative pay for relative performance".
- A resource allocation system which is based on four principles: (i) the principle of zero-based resource allocation, (ii) the principle of funding strategies, not projects, (iii) the principle of no capital rationing, and (iv) the principle of zero tolerance for bad growth.
- A performance management process (the high-level strategic and financial control process) which is founded on two basic principles: (i) The performance targets are driven by the plans, rather than the other way around. (ii) The process should have integrity implying that the performance contract must be fully honored by both sides, the chief executive and each business unit head.

33.3 ■ ALCAR APPROACH

The Alcar Group Inc.,³ a management education and software company, developed an approach to VBM which is based on discounted cash flows analysis. The Alcar approach is described fully in the book *Creating Shareholder Value: A Guide for Managers and Investors* authored by Alfred Rappaport⁴, regarded by many as the father of shareholder value.

Determinants of Shareholder Value According to Rappaport, the following seven factors—he calls them “value drivers”—affect shareholder value:

- Rate of sales growth
- Operating profit margin
- Income tax rate
- Investment in working capital
- Fixed capital investment
- Cost of capital
- Value growth duration

While the first six “value drivers” are self-explanatory, the last one, viz., value growth duration, requires some explanation. It represents the period over which investments are expected to earn rates of return in excess of the cost of capital. It is an estimate reflecting the belief of management that competitive advantage will exist for a finite period. Thereafter, the competitive edge would be lost causing the rate of return to regress to the cost of capital. Exhibit 33.4 represents the conceptual framework of the Alcar approach.

³ The consulting and education practices of the Alcar Group Inc. are now part of The LEK/Alcar consulting Group, LLC.

⁴ Published by Free Press in 1998.



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the factory for Rs. 60 million and distribute the proceeds as dividends to shareholders. If it does so, Apex suffers an earnings hit of Rs. 40 million under GAAP. The balance sheet total declines by Rs. 100 million as the factory is sold and Rs. 60 million is paid as dividends to shareholders. Concerned about the decline in earnings, managers would not sell the factory. They would not like to take a hit of Rs. 40 million in earnings, reduce the asset base by Rs. 100 million, and shrink operations as long as they continue to break even under GAAP.

Exhibit 33.10 Depreciation Charge and Capital Charge under Alternative Methods

Panel A : Straight Line Method					
	1	2	3	4	5
Capital	100000	80000	60000	40000	20000
Depreciation	20000	20000	20000	20000	20000
Capital charge	15000	12000	9000	6000	3000
Sum	35000	32000	29000	26000	23000

Panel B : Sinking Fund Method					
	1	2	3	4	5
Capital	100000	85167	68109	48492	25933
Depreciation	14833	17058	19617	22559	25933
Capital charge	15000	12775	10216	7273	3890
Sum	29833	29833	29833	29833	29823

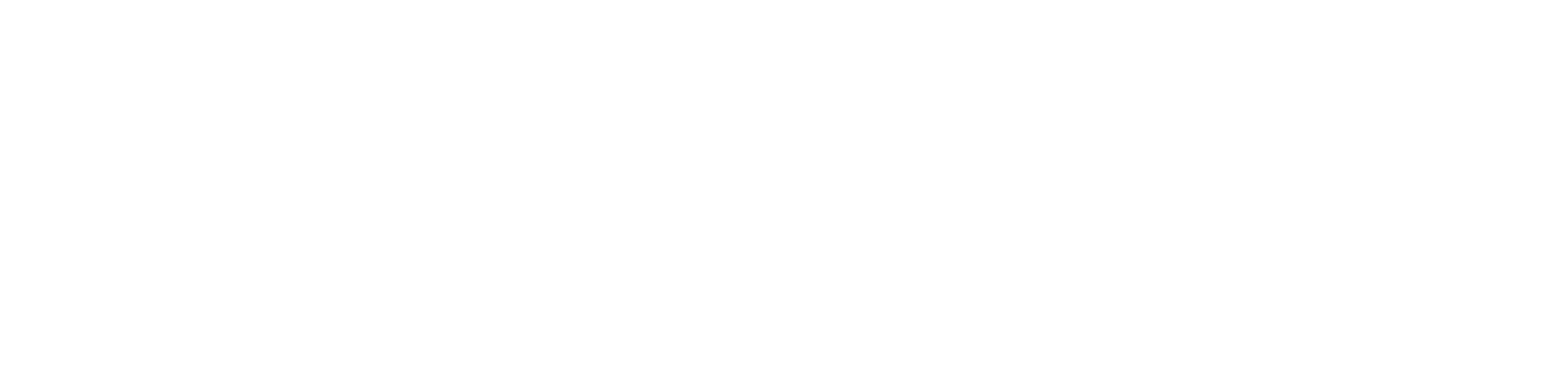
Now look at the same situation under the EVA system. Apex removes Rs. 100 million of assets from its books. Instead of making a Rs. 40 million charge to its income statement, Apex adds a Rs. 40 million restructuring investment to its balance sheet. Capital declines not by Rs. 100 million but by Rs. 60 million, the amount paid to shareholders from the proceeds of the factory. What happens to EVA? EVA improves by Rs. 7.2 million, since the capital charge drops from Rs. 12 million to Rs. 4.8 million. A manager whose bonus is linked to EVA changes would plump for the restructuring option.

Taxes Companies typically use an accelerated method of depreciation (like the written down value method) for computing profits for tax purposes and a slower method (straight line method) for shareholder reporting purposes. Hence the provision for income taxes used in GAAP earnings statement (referred to commonly as book taxes) differs from the cash taxes a company actually pays. Note that book values refer to what a company would owe in taxes if it used GAAP earnings on its tax return.

The difference between book taxes and cash taxes go into a liability account called deferred taxes which are presumably payable in future. The problem with this accounting treatment is that most companies never pay their deferred taxes. Even if a company is growing slowly, the depreciation charge on its tax return will push up the deferred tax liability indefinitely. From an economic point of view what matters is the tax the company pays now and not what it may have to pay in future. So for calculating NOPAT only cash taxes must be deducted. Correspondingly, deferred tax liability must be treated as quasi-equity and included as part of shareholders' funds.



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In vertically integrated companies, there are significant inter-divisional sales. This involves establishing transfer prices to determine business unit revenues and expenses. Transfer pricing is a knotty issue and bad transfer prices lead to bad decisions.

As David Young and Stephen O'Byrne say: "EVA implementation is unlikely to have a big impact on company performance when shared facilities represent a large percentage of business unit assets or intercompany transactions account for a large part of COGS or sales".

Mooring in a Historical, Sunk Cost Measure Compared to book value, economic book value (which is arrived at after making certain adjustments to book value) may be a better estimate of cash invested. Yet it remains a historical sunk cost measure. Investors, however, expect a return on the current market value, which reflects the opportunity cost of maintaining their investment in a business.

33.6 BCG APPROACH

Boston Consulting Group (BCG), an international consulting organisation, has developed an approach to shareholder value management that builds on the pioneering work of their specialist group HOLT Value Associates. Two concepts are at the foundation of the BCG approach: total shareholder return and total business return. For applying these concepts, two performance metrics are used: cash flow return on investment and cash value added.

Total Shareholder Return The total shareholder return (TSR) is the rate of return shareholders earn from owning a company's stock over a period of time:

The TSR for a single holding period is computed as follows.

$$\text{TSR} = \left(\frac{\text{Dividend}}{\text{Beginning market value}} + \frac{\text{Ending market value} - \text{Beginning market value}}{\text{Beginning market value}} \right)$$

The TSR for a multiple holding period is computed using the conventional internal rate of return computation

$$\begin{aligned} \text{Beginning market value} &= \frac{\text{Dividend}_1}{(1 + \text{TSR})^1} + \frac{\text{Dividend}_2}{(1 + \text{TSR})^2} + \frac{\text{Dividend}_n}{(1 + \text{TSR})^n} + \dots \\ &\quad + \frac{\text{Ending market value in year } n}{(1 + \text{TSR})^n} \end{aligned}$$

There are several reasons why BCG regards TSR as the most useful measure of value creation: (i) TSR is comprehensive as it includes dividends as well as capital gains. (ii) TSR is widely used by the investment community and also required by the Securities Exchange Commission.⁸ (iii) TSR can be easily benchmarked against the market or peer groups. (iv) TSR is not biased by size. (v) TSR is difficult to manipulate.

⁸ The regulatory body for the capital market in the US.



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Conducive Circumstances Not all firms can benefit equally from a VBM programme. Firms which seem to gain most from a VBM programme are the ones that have substantial assets that are not productively employed and that have diversified into too many areas beyond their core competence. VBM seems to work best for firms that need to shed assets and achieve focus than for firms that have immense growth opportunities. VBM seems to make more sense for firms that depend more on physical capital than for firms that rely more on intellectual capital.

Need for Customisation One size doesn't fit all. VBM adopters often review the VBM tools of different vendors and customise their own application. Based on their survey of VBM practices, Martin and Petty said: "Finally, we found that many managers do not accept what the vendors say at face value. They learn from the consultants but then adapt the methods to fit their own situation. In fact, in most instances, firms develop their systems in-house rather than hiring a consulting firm."

33.9 ■ POTENTIAL AND HURDLES FOR VBM IN INDIA

The potential and urgency for applying VBM in Indian companies is immense for the following reasons:

- Many companies in India have substantial physical assets which are under-utilised.
- Historically most business groups in India diversified into a number of sectors, thanks to various inducements, compulsions, and temptations. The heightening competition from the mid-1990s has forced many business houses to review and restructure their portfolios to achieve greater focus.
- Equity investors who fared poorly during 1992–2001 have been prodding corporate managements to focus on creating value for shareholders.

While the scope and need for applying VBM in India is enormous, there are some hurdles in doing that which arise mainly from certain attitudes, beliefs, values, and practices that are inimical to VBM. The major hurdles presently are as follows:

- Many managements in India do not seem to have a genuine commitment to promote the welfare of ordinary shareholders. Often there is a divide between the interest of the dominant shareholder (who controls the company) and other shareholders. The dominant shareholder, whether it is a private Indian business group, or a foreign parent, or the Government of India, or whatever, may be more interested in using the company for its parochial objectives and less interested in the welfare of all the shareholders. The market value of the company may not be the main agenda of the dominant shareholder. Indeed, in some cases the dominant shareholder may even welcome a depressed valuation of the company so that it can step up its stake directly in the company by way of a creeping acquisition in the market place or indirectly through a share buyback programme.
- Financial literacy of employees in India is not high and many managements may not be too keen to raise it. Traditionally, financial numbers in India have been closely guarded. The general attitude of the top management may be summed up as follows: "Let the operating people produce more, sell more, and control costs. Let them not



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Annual costs (excluding depreciation, interest, and taxes)	: 4000	Cost of equity	: 18%
		Cost of debt (post-tax)	: 9%

- (a) Calculate the EVA of the project over its life
 (b) Compute the NPV of the project

Solution

$$\text{Cost of capital} = \frac{4}{9} \times 9\% + \frac{5}{9} \times 18\% = 14\%$$

	1	2	3	4
1. Revenues	6000	6000	6000	6000
2. Costs	4000	4000	4000	4000
3. PBDIT	2000	2000	2000	2000
4. Depreciation	1250	1250	1250	1250
5. PBIT	750	750	750	750
6. NOPAT	450	450	450	450
7. Cash flow (4+6)	1700	1700	1700	1700
8. Capital at charge	5000	3750	2500	1250
9. Capital charge (8×0.14)	700	525	350	175
10. EVA (6 - 9)	-250	-75	100	275

$$\text{NPV} = \sum_{t=1}^n \frac{\text{Cash flow}_t}{(1+k)^t} - I = \sum_{t=1}^n \frac{1700}{(1.14)^t} - 5000 = -46.2$$

$$\text{NPV} = \sum_{t=1}^n \frac{\text{EVA}_t}{(1+k)^t} = -250 \times .877 - 75 \times .769 + 100 \times .675 + 275 \times .592 = -46.7$$

- 33.5 An equipment costs 2,000,000 and has an economic life of 4 years at the end of which its expected salvage value is 600,000. If the cost of capital is 12 percent, what will be the depreciation schedule under the sinking fund method?

Solution

$$\text{Equipment cost} = 2,000,000 \quad \text{Economic life} = 4 \text{ years}$$

$$\text{Salvage value} = 600,000 \quad \text{Cost of capital} = 12\%$$

$$\text{Present value of salvage value} = 600,000 \times .636 = 381,600$$

$$\text{Present value of annuity} = 2,000,000 - 381,600 = 1,618,400$$

$$\text{Annuity amount} = \frac{1,618,400}{\text{PVIFA}_{12\%, 4 \text{ years}}} = \frac{1,618,400}{3.037} = 532,894$$

Depreciation charge under sinking fund method

	1	2	3	4
1. Capital	2,000,000	1,707,106	1,379,065	1,011,659
2. Capital charge	240,000	204,853	165,488	121,399
3. Annuity amount	532,894	532,894	532,894	532,894
4. Depreciation	292,894	328,041	367,406	411,495



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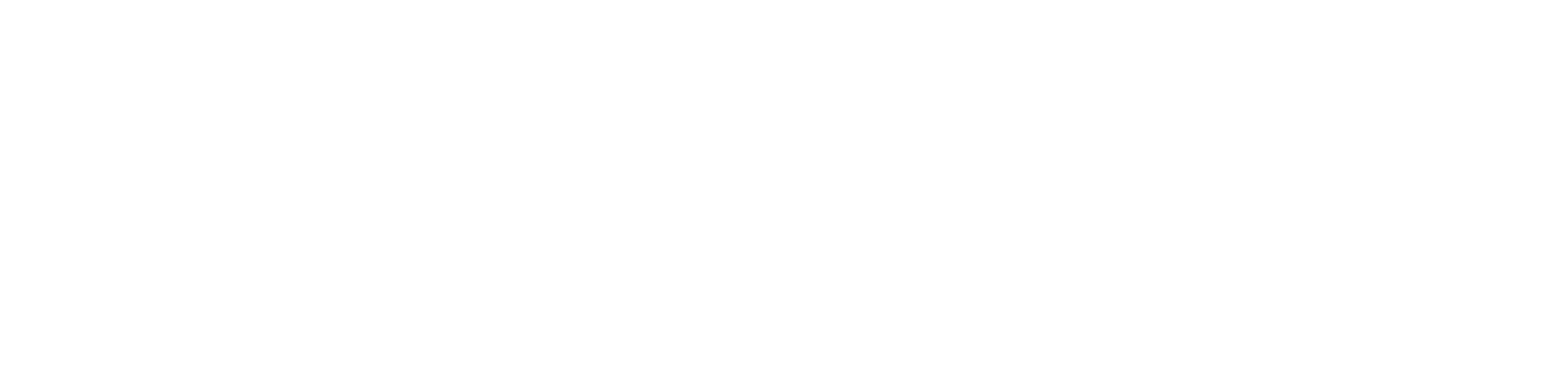
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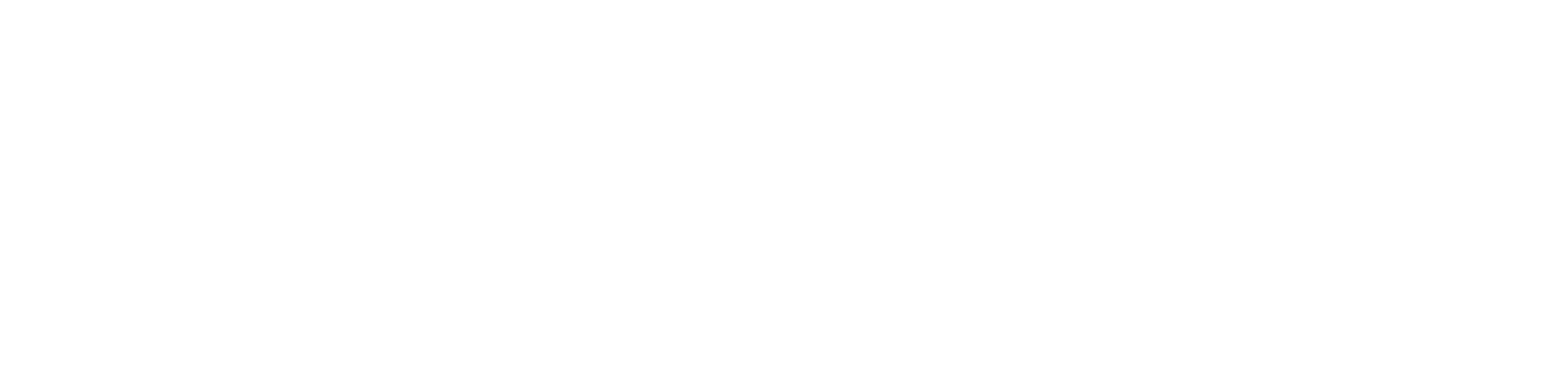
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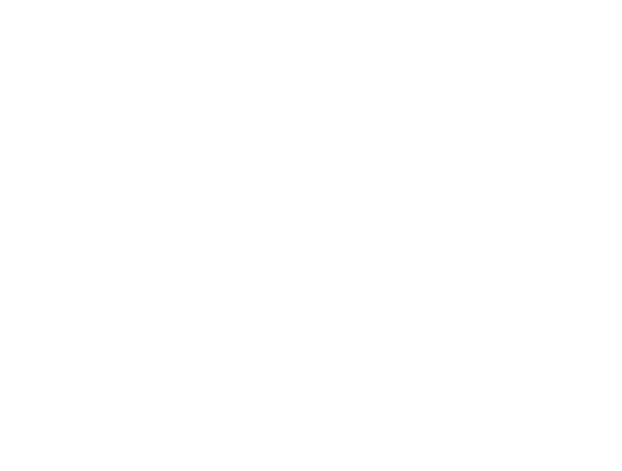
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Division of a Business Empire Demerger is an effective way of dividing a business empire and resolving the issue of succession. In the demerger plan of Reliance Group, Mukesh Ambani acquired control of Reliance Industries, IPCL, and Reliance Industrial Infrastructure and Anil Ambani got Reliance Capital, Reliance Power, and Reliance Telecom. While a demerger is a convenient way of hammering out settlements, promoters are driven by the prospect of value creation.

Tax Aspects of a Demerger A demerger in relation to companies means transfer, pursuant to a scheme of arrangement, by a demerged company of one or more of its undertakings to the resulting company. The demerger, to be entitled to tax concessions, must fulfill the following conditions:

- All the properties of the undertaking being transferred by the demerged company should become the property of the resulting company.
- All the liabilities relatable to the undertaking being transferred by the demerged company should become the liabilities of the resulting company.
- The properties and the liabilities of the undertaking being transferred by the demerged company are transferred at values appearing in its books of account immediately before the demerger.
- The resulting company issues shares to the shareholders of the demerged company on a proportionate basis as a consideration for the demerger.
- The shareholders holding not less than three-fourth in value of shares in the demerged company become shareholders of the resulting company.

Restructuring Plan for Larsen and Toubro

After protracted negotiation and discussion between Larsen and Toubro and Grasim Industries (which held 15.7 percent equity stake in Larsen and Toubro) the following restructuring plan was hammered out in 2003.

- Larsen and Toubro will hive off its cement division into an independent company called CEMCO. Larsen and Toubro will hold 20 percent of the equity of CEMCO and distribute the remaining 80 percent of CEMCO's equity to the shareholders of Larsen and Toubro on a proportionate basis. As a result, Grasim Industries, which has a stake of 15.7 percent in the equity of Larsen and Toubro, will get 12.6 percent equity of CEMCO.
- Grasim Industries will pick up 8.5 percent equity of CEMCO from Larsen and Toubro at Rs. 171.30 per share for which it will pay an aggregate compensation of Rs. 360 crore.
- Grasim Industries will make an open offer at Rs. 171.30 for 30 percent of the equity of CEMCO to raise its stake in CEMCO to 51.1 percent. For this it will incur a cost of Rs. 1280 crore.
- Larsen and Toubro will set up an employee trust which will buy Grasim Industries' 15.7 percent in Larsen and Toubro for Rs. 470 crore.
- Larsen and Toubro will sell its 11.5 percent equity in CEMCO between April 2004 and December 2009.



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filled up. Thus, a group that owns 50 percent plus 1 equity shares can ensure that each director position is filled in by a candidate of its choice. In practice, of course, this can often be done with a smaller equity holding, say between 25 and 40 percent because the remaining equity shareholders usually do not participate in voting or fail to exercise their votes effectively.

Under the cumulative voting system, the number of votes enjoyed by a shareholder is equal to the number of shares held by him times the number of directors to be elected. For example, if a shareholder owns 100 shares and the number of directors to be elected is 7, the shareholder has 700 votes. He may spread his votes in any manner he likes among the contesting candidates. He may cast all the 700 votes in favour of a single candidate or distribute the votes among two or more contestants. Contestants securing the seven highest number of votes get elected.

The principal difference between the majority rule voting system and cumulative voting system is that under the former, the board can be completely dominated by the principal controlling group (save, of course, the positions reserved for institutional investors under special covenants), whereas under the latter a significant minority, if it casts its votes intelligently, is assured of some representation on the board. On the whole, the cumulative voting system improves corporate governance and there is a case for making it the norm, rather than the exception.

While on the system of voting, it is instructive to note that in a seminal theoretical contribution, Sandy Grossman and Oliver Hart⁷ have argued persuasively that ideally one share should carry one vote. This principle implies that non-voting shares are non-optimal. They are likely to reinforce 'entrenchment' and hence impair the quality of corporate governance.

Improve Corporate Accounting and Reporting Practices Periodic accounting reports are the most important means of communication between a company and its financiers (shareholders and creditors). While a lot of improvement has occurred in this informational tool in recent years there is definitely room for improving corporate accounting and reporting practice with respect to classification of items in the balance sheet, investment in group companies, intangible assets, and so on.

Reform of corporate governance practices, thus, calls for a multi-pronged approach on the lines suggested. It is indeed a tall order. Is it feasible to achieve such reforms? A cynic might say that vested interests tend to perpetuate inefficient corporate governance and the political and economic market place is not likely to deliver efficient governance. I do not share this view. Although our understanding of the politics of corporate governance around the globe is rather limited, I am convinced that heightened competition that we are witnessing in all spheres of economic activity will lead to improvement in the quality of corporate governance. Access to external capital on economical terms is now a major competitive weapon and there seems to be no better way to ensure this than to improve

⁷ Sanford J. Grossman and Oliver D. Hart "One Share-One Vote and the Market for Corporate Control," *Journal of Financial Economics*, 1988, vol. 20(1/2).



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1. *Excessive Perquisites* Managers may enjoy various perquisites like jets, foreign travel, expensive club membership, generous expense accounts, and lavish offices that hurt the interest of shareholders.
2. *Differential Risk Attitudes* Shareholders are normally willing to assume more firm-specific risks as they can wash them away through diversification in the capital market. Managers, on the other hand, are not inclined to accept high firm-specific risks as they have greater concern about the security of their job and growth prospects with the firm.
3. *Varying Time Horizons* Managers are eager to establish their reputation quickly to enhance their value in the managerial labour market. They may take actions with an eye on short-term results. This may be inconsistent with the interest of shareholders who are interested in value creation in the long run.

The executive compensation system can be an important means of reconciling the conflicts between managers and shareholders and bringing about a greater congruence in the interests of managers and shareholders.

Failure of Executive Compensation Plans to Promote Value Creation

Often executive compensation plans fail to promote value creation because of three shortcomings:

1. *Linkage Between Size and Pay* There is a strong correlation between company size, measured in terms of sales and/or assets, and executive pay. Such a linkage induces executives to strive for 'bigness' irrespective of whether it leads to value creation or not.
2. *Emphasis on Short-term Performance* Usually, short-term measures of performance like percentage increase in sales or growth of earnings are given considerable weightage in the incentive compensation paid to executives. This leads to a myopic orientation on the part of executives that may detract from value creation.
3. *Reliance on Accounting Measures* The performance of executives is commonly gauged by accounting measures like earnings and return on investment. Accounting measures are often poor proxies for value creation.

The shortcomings of management compensation plans have been neatly described by Alfred Rappaport as follows: "The dysfunctional consequences introduced by the increased-pay-for-increased-size-philosophy and the overemphasis on short-term results are exacerbated by the universal use of accounting numbers for assessing both short and long-term performance."

Objectives for Executive Compensation Policy

Stephen O'Bryne¹¹ has identified four basic objectives for a firm's compensation policy:
Alignment Managers should have incentive to choose strategies, investments, and actions that maximise shareholder value.

¹¹ Stephen O'Bryne, "Executive Compensation" in *Handbook of Modern Finance*, ed. Denis Logue, New York; Warren, Gorham & Lamont, 1997.



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- Non-financial measures are actionable. A major problem about a standard cost system is that it is not often easy to determine the cause and cure of unfavourable variances. In contrast, non-financial measures are actionable at the plant level.
- Non-financial measures may predict better the future cash flows of the firm. For example, the long-term performance of a firm may be substantially influenced by its ability to improve product quality.

Problems with Non-financial Measures While non-financial measures are useful, there are certain problems associated with them:

- It is difficult to assign rupee value to improvements in non-financial measures.
- Non-financial measures may conflict with each other. In the absence of a theoretical framework, it is difficult to make proper tradeoffs.
- Managers may resort to gaming¹. There are opportunities for managers to optimise their performance at the expense of others.

Due to the above deficiencies the very purpose of nonfinancial performance measurement gets defeated. As Ittner and Larker observed: "When such things happen, a company's financial and nonfinancial performance diverge—an ironic outcome, since the original reason for tracking nonfinancial performance was to fill out the picture provided by traditional accounting picture. And yet, it is surprising that nonfinancial measures would be equally, if not more, susceptible to manipulation as financial accounting?"

36.4 ■ BALANCED SCORECARD

Most companies have a performance measurement system that includes financial measures as well as non-financial measures. Financial measures are used primarily by senior managers to monitor the performance of the firm as a whole and its business units or divisions; non-financial measures are employed mainly by operating managers to control short-term operations. Till recently, not much effort was made to combine financial and non-financial measures in an integrated measurement framework. The balanced scorecard approach pioneered by Robert Kaplan, David Norton² and others seeks to develop an integrated performance measurement system.

Distinctive Features The proponents of the balanced scorecard approach claim that it has the following distinctive features:

1. The balanced scorecard is strategy driven. It is a mechanism for implementing the strategy of a business unit into a comprehensive system of performance measurement and management. As Robert Kaplan and David Norton say: "The balanced scorecard is more than a tactical or an operational measurement system. Innovative companies are using the scorecard as a strategic management system to manage their strategy over the long run. They are using the measurement focus of the scorecard to accomplish critical management processes."

¹ This, of course, is true of all measurement system.

² R.S. Kaplan and D.P. Norton, *The Balanced Scorecard*, HBS Press, Boston, Massachusetts, 1996.



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Obviously such opportunities for earning risk-free additional returns cannot persist for long. The demand by American investors for British pounds will push the spot price of the pound beyond \$1.50. Simultaneously, as American investors sell pounds forward to cover their positions, the forward rate of the pound will fall below \$1.50. Moreover, as funds leave the US for Great Britain, the reduced supply of funds in the US will tend to raise the US interest rates. On the other hand, the increased supply of funds in Great Britain will tend to depress the British interest rates.

The combined effect of such transactions and market pressures will result in an equilibrium relationship called interest rate parity (IRP) which precludes covered interest arbitrage transactions. When IRP exists, the difference between the forward rate and the spot rate is just enough to offset the difference between the interest rates in the two currencies. The IRP condition implies that the home interest rate must be higher (lower) than the foreign interest rate by an amount equal to the forward discount (premium) on the home currency. Formally, IRP is stated as follows:

$$\frac{F}{S_o} = \frac{1 + r_h}{1 + r_f} \quad (37.1)$$

where F is the direct quote forward rate, S_o is the direct quote spot rate, r_h is the home (or domestic) interest rate, and r_f is the foreign interest rate.

Example The 90-day interest rate is 1.25 percent in the US and 2.00 percent in the UK and the current spot exchange rate is \$1.50/£. What will be the 90-day forward rate?

$$\frac{F}{\$1.50} = \frac{(1 + 0.0125)}{(1 + 0.020)} \quad F = 1.4890$$

In this case the US dollar appreciates in value relative to the British pound. Explain why this happens.

Purchasing Power Parity

If there are no costs or other barriers associated with the movement of goods or services across countries, the price of each product should be the same in each country, after making appropriate currency conversions. It is called the law of one price in economics. It implies that the exchange rate between the currencies of two countries will be equal to the ratio of the price indexes in these countries. In its absolute version this relationship is called purchasing power parity.

In reality, of course, the purchasing power parity does not hold because of the costs of moving goods and services and the presence of various barriers. For example, the *Economist* magazine regularly reports the price of Big Mac hamburgers in various countries converted into US dollars. In 1995, a Big Mac cost \$2.32 in the United States, \$1.05 in China, \$3.48 in Germany, \$4.65 in Japan, \$5.20 in Switzerland, \$2.80 in United Kingdom, and \$1.82 in Australia. Since it is not possible to buy Big Macs in Australia and ship them for sale to Switzerland, the law of one price does not hold for Big Macs. However, for goods like



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Depository Receipts mechanism and the *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, who 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 US dollars. The depository receipts may be listed and traded on major stock exchanges or may trade in the currency which is converted into dollars by the depository and distributed to the holders of depository receipts. 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. In the case of GDRs issued by Indian companies, the reverse conversion i.e. from shares to GDRs was not permitted earlier. Now it is allowed.

A company planning a GDR issue must obtain the approval from the Ministry of Finance as well as 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 raised. The custodian is required to be an Indian institution.

A few issuers have also exploited the bond route. In recent years, euroconvertible issues (popularly called foreign currency convertible bonds, or FCCBs in short) have been very popular. Some examples: Sterling Biotech Limited issued US \$175 million, 0.50 percent convertible bonds due 2010 and Jaiprakash Associates limited issued € (Euro) 165 million, 0.50 percent convertible bond due 2013. Convertible bonds make sense for companies that want to contain their interest cost during bad times and to do so they 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 bond).

Issues in Foreign Domestic Markets Another way to raise money internationally is to sell securities directly in the domestic capital markets of foreign countries. This is referred to as direct issuance. For example, a British firm may issue dollar-denominated equity stocks in the US capital market or a German firm may issue yen-denominated bonds in the Japanese capital market. A foreign issuer has to satisfy all regulations applicable to domestic firms. In addition, it may be required to fulfill certain special obligations applicable to foreign issuers.

Indian firms can also issue bonds and equities in the domestic capital market of a foreign country. In recent years, Indian firms have tapped the domestic capital markets of countries like the US, Japan, UK, and Switzerland.



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- 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.

37.9 DOCUMENTS IN INTERNATIONAL TRADE

In comparison with domestic trade, international trade presents certain 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 a 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 usance 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. (iii) 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 are generally marketable. So the drawer (the exporter) can sell it before its due date. If the interest rate in the banker's acceptance market is 15 percent, the drawer can sell a 90-day banker's acceptance at a discount of 3.75 percent ($15 \times 90 / 360$) to an investor. For example, a 90-day banker's acceptance of Rs. 100,000 can be sold for Rs. 96,250. The investor on presenting the acceptance to the accepting bank after 90 days would get Rs. 100,000.

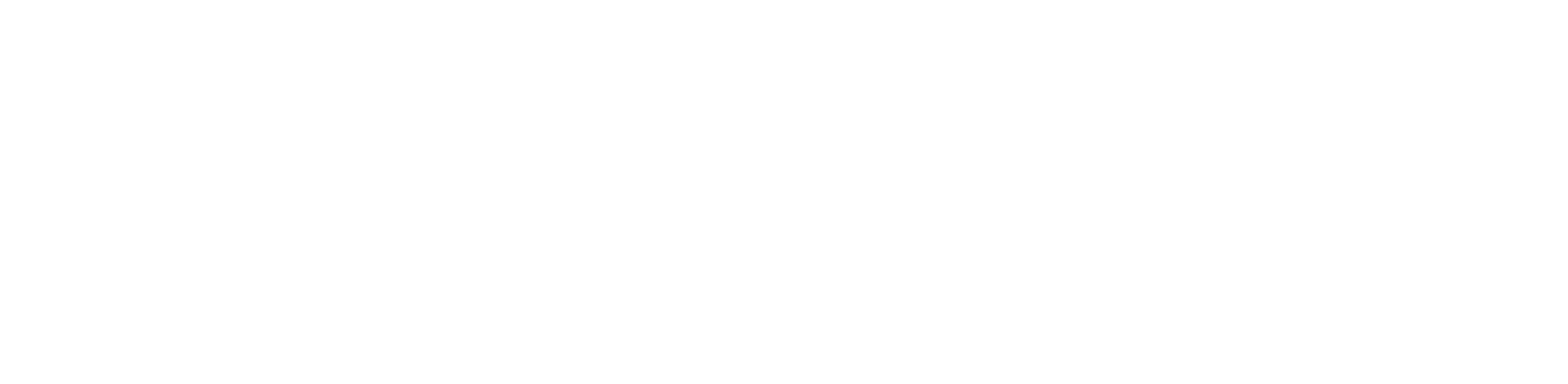
Bill of Lading A bill of lading is a document of shipping employed when the exporter transports goods to the importer. It serves several functions: (i) It is a document of title to goods. (ii) It is a receipt given by the transportation company to deliver the goods to a specified party at a certain destination.

The bill of lading is released to the importer by a creditor 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 usance 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



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Production

- Improper location
- Wrong technology
- Uneconomic plant size
- Unsuitable plant and machinery
- Inadequate emphasis on R&D
- Poor quality control
- Poor maintenance

Finance

- Wrong capital structure
- Bad investment decisions
- Weak management control
- Inadequate MIS
- Poor working capital management
- Strained relations with investors

Marketing

- Inaccurate demand projection
- Improper product-nix
- Wrong product positioning
- Irrational price structure
- Inadequate sales promotion
- High distribution costs
- Poor customer service

Human Resources

- Ineffective leadership
- Inadequate human resources
- Overstaffing
- Poor organisation design
- Insufficient training
- Irrational compensation

RBI Study on Causes of Sickness A study conducted by RBI on the causes of industrial sickness, concluded as follows: "A broad generalisation regarding important causes of industrial sickness emerges. It is observed that the factor most often responsible for industrial sickness can be defined as 'management'. This may take the form of poor production management, poor labour management, poor resources management, lack of professionalism, dissensions within the management, or even dishonest management."

38.3 ■ SYMPTOMS OF SICKNESS

Sickness does not occur overnight, but develops gradually over time. A firm which is becoming sick shows symptoms which indicate that trouble lies ahead of it. Some of the common symptoms are:

- Delay or default in payment to suppliers
- Irregularity in the bank account
- Delay or default in payment to banks and financial institutions
- Non-submission of information to banks and financial institutions
- Frequent requests to banks and financial institutions for additional credit
- Decline in capacity utilisation
- Poor maintenance of plant and machinery
- Low turnover of assets
- Accumulation of inventories
- Inability to take trade discount
- Excessive turnover of personnel
- Extension of accounting period
- Resort to 'creative accounting' which seeks to present a better financial picture than what it really is
- Decline in the price of equity shares and debentures



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pharmaceuticals, and fast moving consumer goods seem to be more intangible-asset intensive whereas firms in sectors such as oil, automobiles, and consumable durables are more tangible-asset intensive.

This chapter highlights certain characteristics or features of intangibles or intangible-intensive firms, discusses the implications of intangible-intensiveness for financial management, explains the techniques for valuing intangibles, and illustrates value-creation by an intangible-intensive firm. It is divided into five sections.

- Characteristics or features of intangible assets or intangible-intensive firms
- Implications of intangible-intensiveness for financial management
- Types of intangible assets and approaches to valuation
- The economic approach to valuation of intangibles
- Infosys Technologies: an exemplar intangible-intensive company

39.1 ■ CHARACTERISTICS OR FEATURES OF INTANGIBLE ASSETS OR INTANGIBLE-INTENSIVE FIRMS

The important characteristics or features of intangible assets or intangible-intensive firms are as follows:

1. While physical, human, and financial assets are rival in nature—a specific deployment of a rival asset precludes its simultaneous use elsewhere—intangible assets are, in general, nonrival in nature. This means that they can be deployed simultaneously in multiple uses. For example, the aircrafts and crew of American Airlines can be used during a given time period only on limited routes whereas its famous reservation system, SABRE, a knowledge-intensive asset, can be used by any number of customers. Intangibles are non-rival mainly because they involve a large fixed (sunk) cost and negligible variable cost. The discovery of a drug or the development of a software programme often requires huge initial investment, but the cost of producing the pills or software diskettes is negligible. This means that intangibles are often characterised by increasing returns to scale.

Given the properties of non-rivalry and increasing returns, intangibles are scalable. This is manifested in the market dominance of many intangible-intensive firms. For example, Intel, Cisco, and American Online enjoy nearly three-fourths of the market in which they operate. Such market dominance is unknown in tangible-intensive sectors, where even the most efficient enterprises such as Exxon, General Electric, or Ford have less than one-fourth of the market share.

2. Physical and financial assets have well defined property rights whereas intangible assets have hazy property rights. Managers of American Airlines do not worry about the possible misappropriation of their planes and facilities by their competitors but are definitely concerned that their reservation system (SABRE) may be imitated by their rivals.

Even when an invention is patented, nonowners can derive benefits, generally referred to as *spillovers*, through imitation (product reengineering). The numerous patent infringement lawsuits reflect the difficulties and costs of appropriating the



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Inter alia, it has been successfully assessed at Level 5 of the Integrated Capability Maturity Model (SEI – CMMI) developed by the Software Engineering Institute (SEI) at Carnegie Mellon University, US. This is a reflection of the maturity and effectiveness of its software processes. The company has also been assessed at Level 5 of the People Capability Maturity Model (PCMM), a testimony of the strong process orientation in its human resources management.

Conducive Work Environment Since the success of Infosys depends on its ability to attract and retain highly talented IT professionals, Infosys pays considerable attention to creating a quality work environment, imparting training, providing challenging assignments, fostering a collegial atmosphere and informal culture, and encouraging free flow of ideas.

Infosys has displayed remarkable foresight in introducing one of the most comprehensive stock option plans in India. The plan has been a very effective instrument to motivate employees, provide long-term incentives for value creation, and induce a sense of ownership among employees.

Integrated Performance Management Infosys has an integrated performance management system that sets challenging targets, facilitates objectives-driven appraisal, and links the variable component of the compensation package to individual, unit, and company performance. All this fosters a culture of high performance work ethic.

Comprehensive Risk Management Infosys has a very comprehensive approach to risk management. The thrust of its risk management practice is to prevent undue concentration of revenues in any one service, client, industry, or geography, hedge against exchange rate risk, eschew debt, maintain strong liquidity, comply with all legal and statutory requirements, develop strong processes and systems, instil proper financial responsibility, and ensure disaster recovery and business continuity plans for all its operations.

Evolved Corporate Governance Infosys firmly believes in aligning the interest of managers with shareholders, complying with the laws in all the countries in which it operates, communicating candidly about how the company is run, and maintaining high standards of transparency and disclosure. The Annual Report of Infosys provides a wealth of information, much beyond what is required statutorily.

The high standards of corporate governance and transparency at Infosys and the quality of its illustrious board instil confidence in investors, both institutional and individual. Combined with the excellent liquidity enjoyed by Infosys shares, this gets translated into a lower cost of capital for the company.

Favourable Tax Environment Infosys has benefited from a variety of tax incentives given to software firms in India. These include relief from import duties on hardware, tax exemption for income derived from software, and tax holidays and infrastructure support for companies operating in specially designed "Software Technology Parks".

Management: The Key Force

Infosys has set an inspiring vision, pursued a well-crafted strategy of leveraging on the off-shore development model, raised capital economically, invested judiciously in infrastructure, technology, systems, processes, human resources, and brand development, established an



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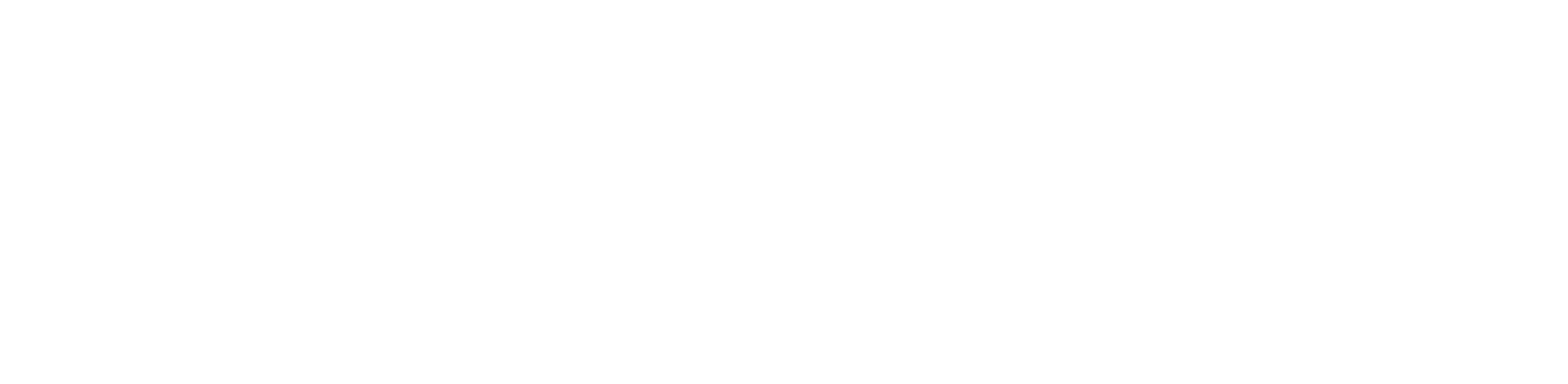
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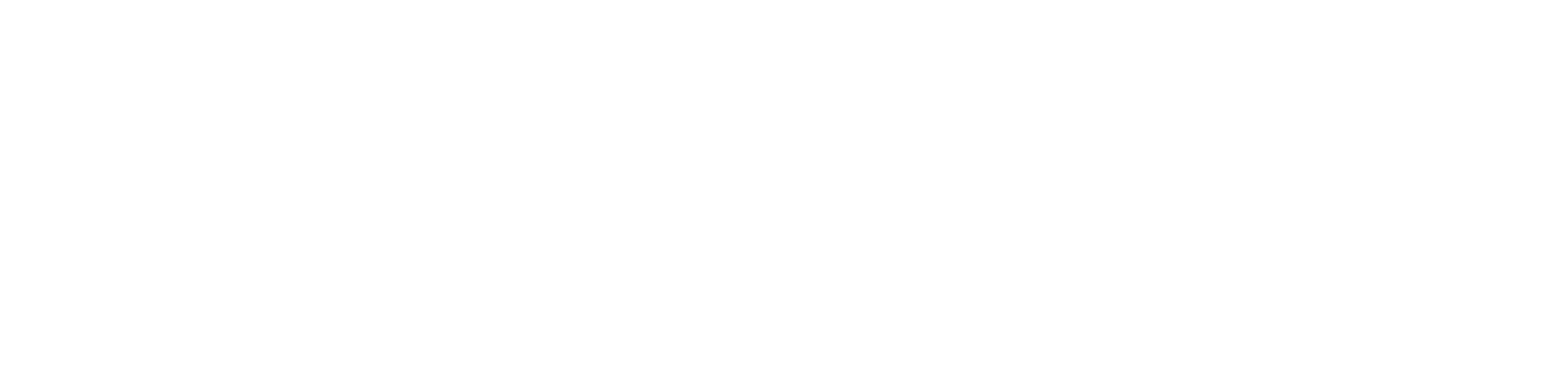
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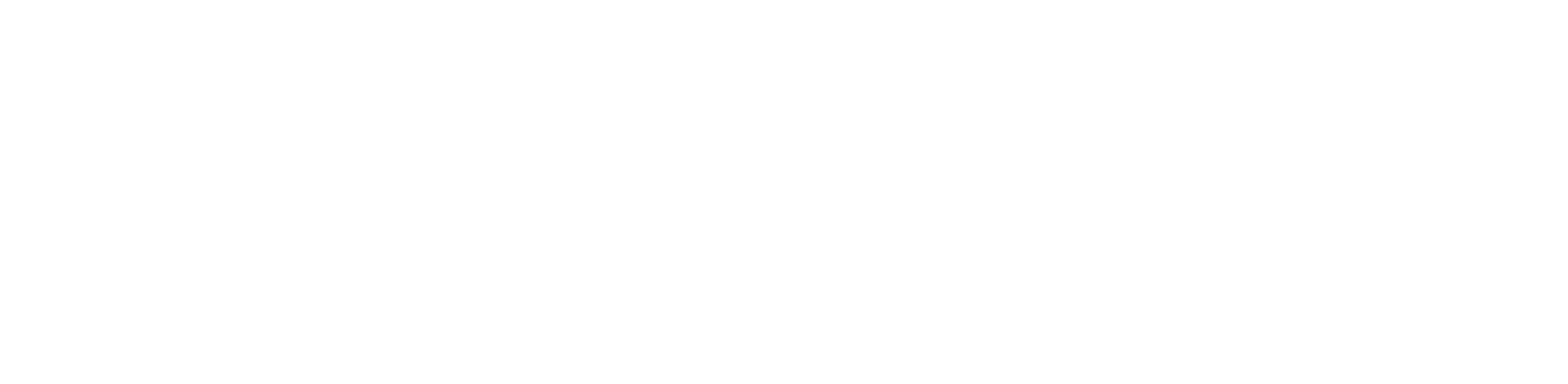
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- Internal process risks
- Political risks

The key initiatives and measures taken by Infosys for prudent risk management are summarised below:

Business Portfolio Risks

- Restrict business from any single service offering to 25 percent of total revenues
- Limit the revenues from any single client to 10 percent of total revenue
- Proactively look for business opportunities in new geographical areas to increase their contribution to total revenues
- Closely monitor the proportions of revenue from various vertical domains and focus marketing efforts in chosen domains
- Solicit business from sunrise technologies to keep the risk of technology concentration within manageable limits.

Financial Risks

- Avoid active trading positions in the foreign currency markets
- Hedge a portion of dollar receivables in the forward market
- Maintain a highly liquid balance sheet in which liquid assets are around 25 per cent of revenues and 40 per cent of total assets
- Eschew debt or use debt financing only for short-term purposes.

Legal and Statutory Risks

- Clearly chart out a review and documentation process for contracts
- Take sufficient insurance abroad to cover possible liabilities arising out of non-performance of the contract
- Avoid contracts which have open ended legal obligations
- Have a compliance officer to advise the company on compliance issues with respect to the laws of various jurisdictions and ensure that the company is not in violation of the laws.

Internal Process Risks

- Adopt ISO 9001 and CMM Level 5 quality standards
- Document and disseminate experienced knowledge
- Create a favourable work environment, encourage innovation, practice meritocracy, and develop a well-balanced compensation plan (that includes ESOP) to attract and retain people.
- Make appropriate investments in technology.

Political Risks

- Explore the possibility of establishing development centres in countries other than India.



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- Paper currency, in a sense the most fundamental financial instrument, was invented when the British Government prohibited the minting of coins by the colonial North America.
- The Eurodollar market developed in response to Regulation Q in the US that imposed a ceiling on the interest rate payable on time deposits with commercial banks.
- Financial swaps emerged initially in response to a restriction imposed by the British Government on dollar financing by British firms and sterling financing by non-British firms.

Since taxes and regulation have triggered a number of major financial innovations, Miller likens them to the grains of sand that irritate the oyster to produce the pearls of financial innovation.

Silber² looks at financial innovations differently from Miller. He considers innovative financial instruments and processes as devices used by companies to reduce the financial constraints faced by them. Firms, he argues, maximise utility under certain constraints, some dictated by governmental regulation, some defined by the market place, and some self-imposed. Financial innovations seek to reduce the cost of complying with these constraints. Here are two examples.

- A lot of effort has gone into the designing of capital notes, which are essentially debt instruments but are treated as 'capital' for the purpose of bank regulation.
- Highly volatile interest rates enhanced the cost of following a policy of investing in fixed dividend rate preferred stock. This stimulated the development of various forms of adjustable rate preferred stock.

Silber's constraint-induced model of innovation explains well a large proportion of commercial bank products. Yet it offers only a partial view of financial innovation as its focus is almost wholly on the issuers of securities, not the investors in securities.

Van Horne³ views a new financial instrument or process as innovative, if it makes the financial markets more efficient and/or complete. A financial innovation makes the market more efficient if it reduces transaction costs or lowers differential taxes or diminishes 'deadweight' losses. A financial innovation makes the market more complete if its after-tax market is one where every contingency in the world is matched by a distinct marketable security. The sheer number of securities required to span every possible contingency suggests that the market is bound to be incomplete in some way or the other. In such a market, there are unfulfilled investor needs. Hence, there is scope for designing securities to satisfy investor desires with respect to maturity, interest rate, protection, cash flow characteristics, put feature, or some other attribute.

According to Van Horne the following factors prompt financial innovation: volatile inflation and interest rates, regulatory changes, tax changes, technological advances, the level of economic activity, and academic work on market efficiency and inefficiency.

² W.L. Silber, "The Process of Financial Innovation", *American Economic Review*, May 1983.

³ J.C. Van Horne, "Of Financial Innovations and Excesses", *Journal of Finance*, July 1985.



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Tables

Table A.1 Future Value Interest Factor (FVIF)
 $FVIF(r, n) = (1 + r)^n$

Period <i>n</i>	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.)



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Table A.4 (Contd.)

Period <i>n</i>	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	5.970	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



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