FINANCIAL MANAGEMENT

(Introduction to Financial Management)

(As Per the Revised Syllabus of F.Y. BAF, 2016-17, Semester I, University of Mumbai)

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Preface

Syllabus

Financial Management

Introduction to Financial Management - I

Sr. No.	Modules	No. of Lectures
1	Introduction to Financial Management	12
2	Concepts in Valuation and Valuation of Securities (Shares and Bonds)	12
3	Leverage	12
4	Types of Financing	12
5	Cost of Capital	12
	Total	**60**

Sr. No.	Modules/Units
1	**Introduction to Financial Management**
	Introduction, Meaning, Importance Scope and Objectives, Profit vs Value Maximization
2	**Concepts in Valuation and Valuation of Securities (Shares and Bonds)**
	The Time Value of Money, Present Value, Internal Rate of Return, Bonds Returns, The Returns from Stocks, Annuity, Techniques of Discounting, Techniques of Compounding
3	**Leverage**
	Introduction, EBIT & EPS Analysis, Types of Leverages: Operating Leverage, Financial Leverage & Composite Leverage, Relationship between Operating Leverage and Financial Leverage (Including Practical Problems)
4	**Types of Financing**
	Introduction, Needs of Finance and Sources: Long Term, Medium Term, Short Term, Long Term Sources of Finance, Short Term Sources of Finance
5	**Cost of Capital**
	Introduction, Definition and Importance of Cost of Capital, Measurement of Cost of Capital, WACC (Including Practical Problems)

Paper Pattern

Contents

Chapter 1

Introduction to Financial Management

EVOLUTION OF FINANCIAL MANAGEMENT

Financial management emerged as a distinct field of study at the turn of this 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, reorganization, 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 the investment bankers, lenders, and other outside interests.

A typical work of the traditional phase is *The Financial Policy of Corporations* 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* being around the early forties and continued through the early fifties. 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 finance managers in the areas of fund analyses, planning and control. These problems, however, were discussed within limited analytical frameworks. A representative work of this phase is *Essays on Business Finance* by Wilford J. Eiteman *et al*.

The *modern phase* began in the mid-fifties 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 scope of financial management has broadened. The central concern of financial management is considered to be a rational matching of funds to their uses in the light of appropriate decision criteria.
- The approach of financial management has become more analytical and quantitative.
- The point of view of the managerial decision maker has become dominant.

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

- Early 1900: instrument, institution, and procedures of capital market and money market
- Around 1920: focus on security and banking sector, and investment in common stock
- Around 1930: focus on liquidity, debt, regulation, bankruptcy, reorganization
- Early 1940 and 1950: internal analysis, planning and controlling cash flow
- End of 1950: capital budgeting, valuation, and dividend policy
- Around 1960: development of portfolio theory
- Around 1970: CAPM model and APT model that can be used to value the financial assets
- Around 1980: focus on uncertainty, asymmetric information, financial signaling
- Around 1990: multinational financial management, behavioral finance, enterprise risk management, good corporate governance.

MEANING OF FINANCIAL MANAGEMENT

Financial Management means planning, organizing, directing and controlling the financial activities such as procurement and utilization of funds of the enterprise. It means applying general management principles to financial resources of the enterprise.

IMPORTANCE OF FINANCIAL MANAGEMENT

In a big organisation, the general manger or the managing director is the overall incharge of the organisation but he gets all the activities done by delegating all or some of his powers to men in the middle or lower management, who are supposed to be specialists in the field so that better results may be obtained.

For example, management and control of production may be delegated to a man who is specialist in the techniques, procedures and methods of production. We may designate him "Production Manager". So is the case with other branches of management, i.e., personnel, finance, sales, etc.

The incharge of the finance department may be called financial manager, finance controller, or director of finance who is responsible for the procurement and proper utilisation of finance in the business and for maintaining coordination between all other branches of management.

Importance of finance cannot be overemphasised. It is, indeed, the key to successful business operations. Without proper administration of finance, no business enterprise can reach its full potentials for growth and success. Money is a universal lubricant which keeps the enterprise dynamic – develops product, keeps men and machines at work, encourages management to make progress and creates values. The importance of financial administration can be discussed under the following heads:

(i) Success of Promotion Depends on Financial Administration. One of the most important reasons of failure of business promotions is a defective financial plan. If the plan adopted fails to provide sufficient capital to meet the requirements of fixed and fluctuating capital and particularly, the latter, or it fails to assume the obligations by the corporations without establishing earning power, the business cannot be carried on successfully. Hence, sound financial plan is very necessary for the success of a business enterprise.

(ii) Smooth Running of an Enterprise. Sound financial planning is necessary for the smooth running of an enterprise. Money is to an enterprise, what oil is to an engine. As, Finance is required at each stage of an enterprise, i.e., promotion, incorporation, development, expansion and administration of day to day working, etc., proper administration of finance is very necessary. Proper financial administration means the study, analysis and evaluation of all financial problems to be faced by the management and to take proper decision with reference to the present circumstances in regard to the procurement and utilisation of funds.

(iii) Financial Administration Coordinates Various Functional Activities. Financial administration provides complete coordination between various functional areas such as marketing, production, etc., to achieve the organisational goals. If financial management is defective, the efficiency of all other departments can, in no way, be maintained. For example, it is very necessary for the finance department to provide finance for the purchase of raw materials and meeting other day to day expenses for the smooth running of the production unit. If financial department fails in its obligations, the production and the sales will suffer and consequently, the income of the concern and the rate of profit on investment will also suffer. Thus, Financial administration occupies a central place in the business organisation which controls and coordinates all other activities in the concern.

(iv) Focal Point of Decision Making. Almost, every decision in the business is taken in the light of its profitability. Financial administration provides scientific analysis of all facts and figures through various financial tools, such as different financial statements, budgets, etc., which help in evaluating the profitability of the plan in the given circumstances, so that a proper decision can be taken to minimise the risk involved in the plan.

(v) **Determinant of Business Success.** It has been recognised, even in India that the financial managers play a very important role in the success of business organisation by advising the top management for the solution of the various financial problems as experts. They present important facts and figures regarding financial position and the performance of various functions of the company in a given period before the top management in such a way so as to make it easier for the top management to evaluate the progress of the company to amend suitably the principles and policies of the company. The financial managers assist the top management in its decision making process by suggesting the best possible alternative out of the various alternatives of the problem available. Hence, financial management helps the management at different levels in taking financial decisions.

(vi) **Measure of Performance.** The performance of the firm can be measured by its financial results, i.e., by its size of earnings. Riskiness and profitability are two major factors which jointly determine the value of the concern. Financial decisions which increase risks will decrease the value of the firm and on the other hand, financial decisions which increases the profitability will increase value of the firm. Risk and profitability are two essential ingredients of a business concern.

The importance of financial management can be summarized as follows:

1. It brings economic growth and development through investments, financing, dividend and risk management decision which help companies to undertake better projects.
2. When there is good growth and development of the economy it will ultimately improve the standard of living of all people.
3. Improved standard of living will lead to good health and financial stress will reduce considerably.
4. It enables the individual to take better financial decision which will reduce poverty, reduce debts, increase savings and investments.

Better financial ability will lead to profitability which will create new jobs and in turn lead to more development, expansion and will promote efficiency

SCOPE/ELEMENTS AND OBJECTIVES OF FINANCIAL MANAGEMENT

Scope/Elements

1. Investment decisions includes investment in fixed assets (called as capital budgeting). Investment in current assets are also a part of investment decisions called as working capital decisions.
2. Financial decisions - They relate to the raising of finance from various resources which will depend upon decision on type of source, period of financing, cost of financing and the returns thereby.

(a) *Dividend decision:* The finance manager has to take decision with regards to the net profit distribution. Net profits are generally divided into two: Dividend for shareholders – Dividend and the rate of it has to be decided.

(b) *Retained profits:* Amount of retained profits has to be finalized which will depend upon expansion and diversification plans of the enterprise.

Scope of Financial Management: Financial management has a wide scope. According to **Dr. S. C. Saxena**, the scope of financial management includes the following **five 'A's**.

1. **Anticipation:** Financial management estimates the financial needs of the company, that is, it finds out how much finance is required by the company.
2. **Acquisition:** It collects finance for the company from different sources.
3. **Allocation:** It uses this collected finance to purchase fixed and current assets for the company.
4. **Appropriation:** It divides the company's profits among the shareholders, debenture holders, etc. It keeps a part of the profits as reserves.
5. **Assessment:** It also controls all the financial activities of the company. Financial management is the most important functional area of management. All other functional areas such as production management, marketing management, personnel management, etc., depends on financial management. Efficient financial management is required for survival, growth and success of the company or firm.

Objectives of Financial Management

The financial management is generally concerned with procurement, allocation and control of financial resources of a concern. The objectives can be –

1. To ensure regular and adequate supply of funds to the concern.
2. To ensure adequate returns to the shareholders which will depend upon the earning capacity, market price of the share, expectations of the shareholders.
3. To ensure optimum funds utilization. Once the funds are procured, they should be utilized in maximum possible way at least cost.
4. To ensure safety on investment, i.e., funds should be invested in safe ventures so that adequate rate of return can be achieved.
5. To plan a sound capital structure. There should be sound and fair composition of capital so that a balance is maintained between debt and equity capital.

CONFLICTS IN PRINCIPLES OF PROFIT VS. VALUE MAXIMISATION

Goals mean financial objective of a firm. Experts in financial management have endorsed the view that the goal of Financial Management of a firm is maximization of economic welfare of its shareholders. Maximization of economic welfare means maximization of wealth of its shareholders. Shareholders' wealth maximization is reflected in the market value of the firms' shares. A firm's contribution to the society is maximized when it maximizes its value. There are two versions of the goals of financial management of the firm:

Profit Maximization: In a competitive economy, profit maximization has been considered as the legitimate objective of a firm because profit maximization is based on the cardinal rule of efficiency. Under perfect competition allocation of resources shall be based on the goal of profit maximization. A firm's performance is evaluated in terms of profitability. Investor's perception of company's performance can be traced to the goal of profit maximization. But, the goal of profit maximization has been criticized on many accounts:

1. The concept of profit lacks clarity. What does the profit mean?
   (a) Is it profit after tax or before tax?
   (b) Is it operating profit or net profit available to shareholders?
   Differences in interpretation on the concept of profit expose the weakness of the goal of profit maximization.
2. Profit maximization ignores time value of money because it does not differentiate between profits of current year with the profit to be earned in later years.
3. The concept of profit maximization fails to consider the fluctuation in the profits earned from year to year. Fluctuations may be attributable to the business risk of the firm but the concept fails to throw light on this aspect.
4. Profit maximization does not make clear the concept of profit as to whether it is accounting profit or economic normal profit or economic supernormal profits.
5. Because of these deficiencies, profit maximization fails to meet the standards stipulated in an operationally feasible criterion for maximizing shareholders wealth.

Value or Wealth Maximization: Wealth Maximization has been accepted by the finance managers, because it overcomes the limitations of profit maximisation. Wealth maximisation means maximizing the net wealth of the company's shareholders. Wealth maximisation is possible only when the company pursues policies that would increase the market value of shares of the company.

Following arguments are in support of the superiority of wealth maximisation over profit maximisation:

1. Wealth maximisation is based on the concept of cash flows. Cash flows are a reality and not based on any subjective interpretation. On the other hand there are many subjective elements in the concept of profit maximisation.
2. It considers time value of money. Time value of money translates cash flows occurring at different periods into a comparable value at zero period. In this process, the quality of cash flows is considered critically in all decisions as it incorporates the risk associated with the cash flow stream. It finally crystallizes into the rate of return that will motivate investors to part with their hard earned savings. It is called required rate of return or hurdle rate which is employed in evaluating all capital projects undertaken by the firm. Maximizing the wealth of shareholders means positive net present value of the decisions implemented. Positive net present value can be defined as the excess of present value of cash inflows of any decision implemented over the present value of cash outflows associated with the process of

implementation of the decisions taken. To compute net present value we employ time value factor. Time value factor is known as time preference rate, i.e., the sum of risk free rate and risk premium. Risk free rate is the rate that an investor can earn on any government security for the duration under consideration. Risk premium is the consideration for the risk perceived by the investor in investing in that asset or security.

X Ltd., is a listed company engaged in the business of FMCG (Fast Moving Consumer Goods). Listed means the company's shares are allowed to be traded officially on the portals of the stock exchange. The Board of Directors of X Ltd., took a decision in one of its Board meeting, to enter into the business of power generation. When the company informs the stock exchange at the conclusion of the meeting of the decision taken, the stock market reacts unfavourably with the result that the next days' closing of quotation was 30 % less than that of the previous day.

The question now is, why the market reacted in this manner. Investors in this FMCG Company might have thought that the risk profile of the new business (power) that the company wants to take up is higher compared to the risk profile of the existing FMCG business of X Ltd. When they want a higher return, market value of company's share declines. Therefore, the risk profile of the company gets translated into a time value factor. The time value factor so translated becomes the required rate of return. Required rate of return is the return that the investors want for making investment in that sector.

Any project which generates positive net present value, creates wealth to the company. When a company creates wealth from a course of action it has initiated the shareholders benefit because such a course of action will increase the market value of the company's shares.

Functions of Financial Management

1. **Estimation of Capital Requirements:** A finance manager has to make estimation with regards to capital requirements of the company. This will depend upon expected costs and profits and future programmes and policies of a concern. Estimations have to be made in an adequate manner which increases earning capacity of an enterprise.
2. **Determination of Capital Composition:** Once the estimation have been made, the capital structure have to be decided. This involves short and long-term debt equity analysis. This will depend upon the proportion of equity capital a company is possessing and additional funds which have to be raised from outside parties.
3. **Choice of Sources of Funds:** For additional funds to be procured, a company has many choices like:

   (a) Issue of shares and debentures

   (b) Loans to be taken from banks and financial institutions

   (c) Public deposits to be drawn like in form of bonds.

   Choice of factor will depend on relative merits and demerits of each source and period of financing.

4. **Investment of Funds:** The finance manager has to decide to allocate funds into profitable ventures so that there is safety on investment and regular returns is possible.
5. **Disposal of Surplus:** The net profits decision have to be made by the finance manager. This can be done in two ways:
   (a) *Dividend declaration:* It includes identifying the rate of dividends and other benefits like bonus.
   (b) *Retained profits:* The volume has to be decided which will depend upon expansional, innovational, diversification plans of the company.
6. **Management of Cash:** Finance manager has to make decisions with regards to cash management. Cash is required for many purposes like payment of wages and salaries, payment of electricity and water bills, payment to creditors, meeting current liabilities, maintenance of enough stock, purchase of raw materials, etc.
7. **Financial Controls:** The finance manager has not only to plan, procure and utilize the funds but he also has to exercise control over finances. This can be done through many techniques like ratio analysis, financial forecasting, cost and profit control, etc.

EXERCISE

Self-assessment Questions

1. Financial Management deals with procurement of funds at the least cost and _____ of funds.
2. Under perfect competition, allocation of resources shall be based on the goal of _____.
3. _____ is based on cash flows.
4. _____ consider time value of money.
5. _____ lead to investment in real assets.
6. _____ relate to the acquisition of funds at the least cost.
7. Formulation of inventory policy is an important element of _____.
8. Obtaining finance is an important function of _____.

[**Ans.** 1. Effective utilization, 2. Profit maximisation, 3. Wealth maximization, 4. Wealth maximization, 5. Investment decisions, 6. Financing decisions, 7. Liquidity, 8. Treasurers]

Terminal Questions

1. What are the objectives of financial management?
2. How does a finance manager arrive at an optimal capital structure?
3. Examine the relationship of financial management with other functional areas of a firm.

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Chapter 2

Concepts in Valuation and Valuation of Securities (Shares and Bonds)

THE TIME VALUE OF MONEY

Introduction

To keep pace with the increasing competition, companies have to go in for new ideas implemented through new projects be it for expansion, diversification or modernization. A project is an activity that involves investing a sum of money now in anticipation of benefits spread over a period of time in the future. How do we determine whether the project is financially viable or not? Our immediate response to this question will be to sum up the benefits accruing over the future period and compare the total value of the benefits with the initial investment. If the aggregate value of the benefits exceeds the initial investment, the project is considered to be financially viable.

While this approach *prima facie* appears to be satisfactory, we must be aware of an important assumption that underlies. We have assumed that irrespective of the time when money is invested or received, the value of money remains the same. Put differently, we have assumed that: value of one rupee now = value of one rupee at the end of year 1 = value of one rupee at the end of year 2 and so on. We know intuitively that this assumption is incorrect because money has time value. How do we define this time value of money and build it into the cash flows of a project? The answer to this question forms the subject matter of this chapter.

We intuitively know that ₹ 1,000 in hand now is more valuable than ₹ 1,000 receivable after a year. In other words, we will not part with ₹ 1,000 now in return for a firm assurance that the same sum will be repaid after a year. But we might part with ₹ 1,000 now if we are assured that something more than ₹ 1,000 will be paid at the end of the first year. This additional compensation required for parting with ₹ 1,000 now is called 'interest' or the time value of money. Normally, interest is expressed in terms of percentage per annum for example, 12 per cent p.a. or 18 per cent p.a. and so on.

Why should money have time value? Here are some important reasons for this phenomenon:

Money can be employed productively to generate real returns. For instance, if a sum of ₹ 100 invested in raw material and labor results in finished goods worth ₹ 105, we can say that the investment of ₹ 100 has earned a rate of return of 5 per cent.

In an inflationary period, a rupee today has a higher purchasing power than a rupee in the future.

Since future is characterized by uncertainty, individuals prefer current consumption to future consumption.

The manner in which these three determinants combine to determine the rate of interest can be symbolically represented as follows:

Nominal or market interest rate

= Real rate of interest or return + Expected rate of inflation

+ Risk premiums to compensate for uncertainty

There are two methods by which the time value of money can be taken care of – compounding and discounting. To understand the basic ideas underlying these two methods, let us consider a project which involves an immediate outflow of say ₹ 1,000 and the following pattern of inflows:

Year 1: ₹ 250

Year 2: ₹ 500

Year 3: ₹ 750

Year 4: ₹ 750

The initial outflow and the subsequent inflows can be represented on a time line as given below:

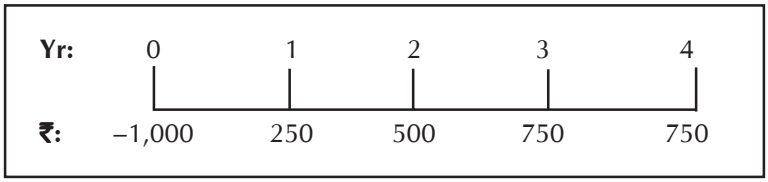

Figure 2.1: Time Line

Process of Compounding

Under the method of compounding, we find the future values (FV) of all the cash flows at the end of the time horizon at a particular rate of interest. Therefore, in this case we will be comparing the future value of the initial outflow of ₹ 1,000 as at the end of year 4 with the sum of the future values of the yearly cash inflows at the end of year 4. This process can be schematically represented as follows:

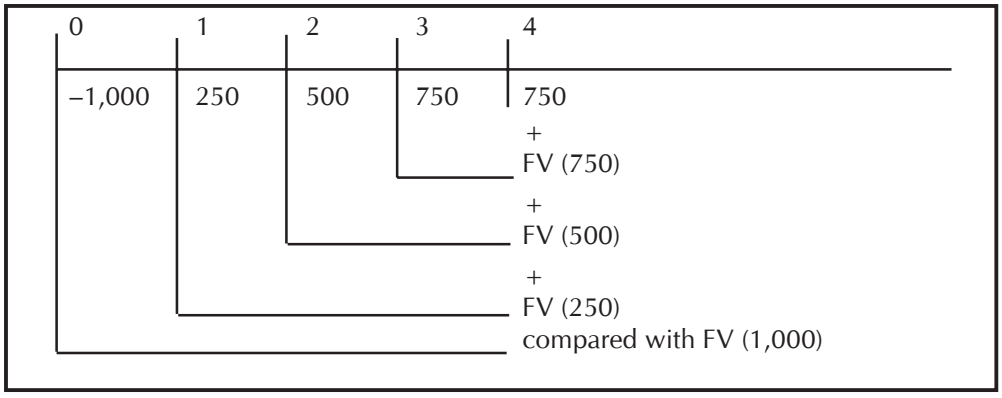

Figure 2.2: Process of Compounding

Under this method of compounding, the future values of all cash inflows at the end of the time horizon at a particular rate of interest are found. Interest is compounded when the amount earned on an initial deposit becomes part of the principal at the end of the first compounding period. If Mr. A invests ₹ 1,000 in a bank which offers him 5% interest compounded annually, he has ₹ 1,050 in his account at the end of the first year. The total of the interest and principal ₹ 1,050 constitutes the principal for the next year. He thus earns ₹ 1,102.50 for the second year. This becomes the principal for the third year. This compounding procedure will continue for an indefinite number of years. The compounding of interest can be calculated by the following equation:

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

Where, A = Amount at the end of the period

P = Principal at the end of the period

i = Rate of interest

n = Number of years

The amount of money in the account at the end of various years is calculated as under, using the equation:

Amount at the end of year 1 = ₹ 1,000 (1 + 0.05) = ₹ 1,050

Amount at the end of year 2 = ₹ 1,050 (1 + 0.05) = ₹ 1,102.50

Amount at the end of year 3 = ₹ 1,102.50 (1 + 0.05) = ₹ 1,157.63

Year	1	2	3
Beginning amount	₹ 1,000	₹ 1,050	₹ 1,102.50
Interest rate	5%	5%	5%
Amount of interest	50	52.50	55.13
Beginning principal	1,000	₹ 1,050	₹ 1,102.50
Ending principal	₹ 1,050	₹ 1,102.50	₹ 1,157.63

The amount at the end of year 2 can be ascertained by substituting

₹ 1000 (1 + 0.05) for

₹ 1,050, that is, ₹ 1,000(1 + 0.05) (1 + 0.05) = ₹ 1,102.50.

Similarly, the amount at the end of year 3 can be ascertained by substituting

₹ 1,000(1 + 0.05) (1 + 0.05) (1 + 0.05) = ₹ 1,157.63.

Thus by substituting the actual figures for the investment or ₹ 1,000 in the formula $A = P(1 + i)^n$, we arrive at the result shown above in the Table.

Process of Discounting

Under the method of discounting, we reckon the time value of money now, i.e., at time 0 on the time line. So, we will be comparing the initial outflow with the sum of the present values (PV) of the future inflows at a given rate of interest. This process can be diagrammatically represented as follows:

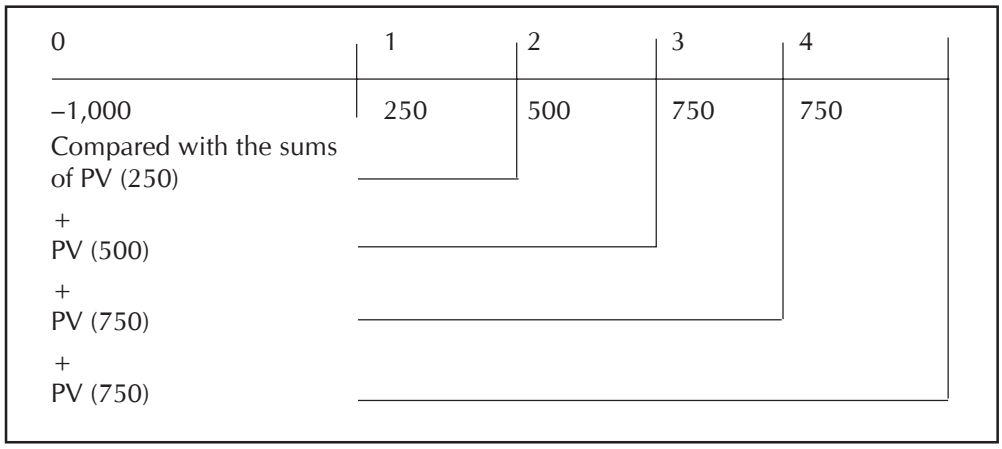

Figure 2.3: Process of Discounting

How do we compute the future values and the present values? This question is answered in the latter part of the chapter. But before that, we must draw the distinction between the concepts of compound interest and simple interest. We shall illustrate this distinction through the following illustration.

Under the method of discounting, we find the time value of money now, that is, at time 0 on the time line. It is concerned with determining the present value of a future amount. This is in contrast to the compounding approach where we convert present amounts into future amounts; in discounting approach we convert the future value to present sums. For example, if Mr. A requires to have ₹ 1,050 at the end of year 1, given the rate of interest as 5%, he would like to know how much he should invest today to earn this amount. If P is the unknown amount and using the equation we get P (1 + 0.5) = 1,050. Solving the equation, we get P = ₹ 1,050/1.05 = ₹ 1,000.

Thus ₹ 1,000 would be the required principal investment to have ₹ 1,050 at the end of year 1 at 5% interest rate. In other words, the present value of ₹ 1,050 received one year from now, rate of interest 5%, is ₹ 1,000. The present value of money is the reciprocal of the compounding value. Mathematically, we have $P = A\{1/(1 + i)^n\}$ in which P is the present value for the future sum to be received, *A* is the sum to be received in future, *i* is the interest rate and *n* is the number of years.

Illustration 1. If X has a sum of ₹ 1,000 to be invested, and there are two schemes, one offering a rate of interest of 10 per cent, compounded annually, and other offering a simple rate of interest of 10 per cent, which one should he opt for assuming that he will withdraw the amount at the end of (a) one year (b) two years, and (c) five years?

Solution: Given the initial investment of ₹ 1,000, the accumulations under the two schemes will be as follows:

End of Year	Compounded Interest Scheme	Simple Interest Scheme
1	1000 + (1000 × 0.10) = 1,100	1000 + (1000 × 0.10) = 1,100
2	1100 + (1100 × 0.10) = 1,210	1100 + (1000 × 0.10) = 1,200
3	1210 + (1210 × 0.10) = 1,331	1200 + (1000 × 0.10) = 1,300
4	1331 + (1331 × 0.10) = 1,464	1300 + (1000 × 0.10) = 1,400
5	1464 + (1464 × 0.10) = 1,610	1400 + (1000 × 0.10) = 1,500

From this Table, it is clear that under the compound interest scheme interest earns interest, whereas interest does not earn any additional interest under the simple interest scheme. Obviously, an investor seeking to maximize returns will opt for the compound interest scheme if his holding period is more than a year. We have drawn the distinction between compound interest and simple interest here to emphasize that in financial analysis we always assume interest to be compounded.

Future Value of a Single Flow (Lump Sum)

The above Table illustrates the process of determining the future value of a lump sum amount invested at one point of time. But the way it has gone about calculating the future value will prove to be cumbersome if the future value over long maturity periods of 20 years or 30 years is to be calculated. A generalized procedure for calculating the future value of a single cash flow compounded annually is as follows:

$$FV_n = PV(1 + k)^n$$

where,

FV_n = Future value of the initial flow n years hence,

PV = Initial cash flow

k or i = Annual rate of interest

n = Life of investment

In the above formula, the expression $(1 + k)^n$ represents the future value of an initial investment of ₹ 1 (one rupee invested today) at the end of n years at a rate of interest k referred to as Future Value Interest Factor (FVIF, hereafter). To simplify calculations, this expression has been evaluated for various combinations of k and n and these values are presented in Table 1 at the end of this book. To calculate the future value of any investment for a given value of 'k' and 'n', the corresponding value of $(1 + k)^n$ from the table has to be multiplied with the initial investment.

Illustration 2. The fixed deposit scheme of Andhra Bank offers the following interest rates.

Period of Deposit	Rate per Annum
46 days to 179 days	10.0%
180 days to < 1 year	10.5%
1 year and above	11.0%

An amount of ₹ 10,000 invested today will grow in 3 years to

Solution: $FV_n = PV(1 + k)^n$

= PV x FVIF (11, 3)

= 10,000 (1.368)

= ₹ 13,680

Illustration 3. The fixed deposit scheme of a bank offers the following interest rates:

Period of Deposit	Rate per Annum
<45 days	9%
46 days to 179 days	10%
180 days to 365 days	10.5%
366 days and above	12%

How much does an investment of ₹ 10,000 invested today grow to in 3 year?

Solution: $FV_n = PV(1 + i)^n$ or PV × FVIF(12%, 3y)

= 10,000 × 1.4049 (from the Tables)

= ₹ 14,049

Doubling Period: A frequent question posed by the investor is, "How long will it take for the amount invested to be doubled for a given rate of interest". This question can be answered by a rule known as 'rule of 72'. Though it is a crude way of calculating this rule says that the period within which the amount will be doubled is obtained by dividing 72 by the rate of interest.

For instance, if the given rate of interest is 6 per cent, then doubling period is 72/6 = 12 yrs.

However, an accurate way of calculating doubling period is the 'rule of 69', according to which, doubling period

$$= 0.35 + \frac{69}{\text{Interest rate}}$$

Illustration 4. The following is the calculation of doubling period for two rates of interest, i.e., 6 per cent and 12 per cent.

Solution:

Rate of interest	Doubling Period
6%	= 0.35 + 69/6 = 0.35 + 11.5 = 11.85 yrs.
12%	= 0.35 + 69/12 = 0.35 + 5.75 = 6.1 yrs.

Growth Rate: The compound rate of growth for a given series for a period of time can be calculated by employing the future value interest factor table (FVIF).

For instance, if your company currently has 5,000 employees and this number is expected to grow by 5% p.a. How many employees will your company have after 10 years.

$= 5{,}000\ (1.05)^{10} = 5{,}000 \times (1.629) = 8.145$

Illustration 5.

Years	1	2	3	4	5	6
Profits (in lakh)	95	105	140	160	165	170

How is the compound rate of growth for the above series determined? This can be done in two steps:

Solution:

The ratio of profits for year 6 to year 1 is to be determined, i.e., 170/95 = 1.79

The $FVIF_{k,n}$ table is to be looked at. Look at a value which is close to 1.79 for the row for 5 years. The value close to 1.79 is 1.762 and the interest rate corresponding to this is 12 per cent. Therefore, the compound rate of growth is 12 per cent.

Increased Frequency of Compounding: In the above illustration, the compounding has been done annually. Suppose we are offered a scheme where compounding is done more frequently. For example, assume you have deposited ₹ 10,000 in a bank which offers 10 per cent interest per annum compounded semi-annually which means that interest is paid every six months.

		₹
Now, amount in the beginning	=	10,000
Interest @ 10 per cent p.a. for first six months	=	500
Amount at the end of six months $\left(10{,}000 \times \frac{0.1}{2}\right)$	=	10,500
Interest for second 6 months $\left(10{,}500 \times \frac{0.1}{2}\right)$	=	525
Amount at the end of the year	=	11,025

Instead, if the compounding is done annually, the amount at the end of the year will be 10,000 (1 + 0.1) = ₹ 11,000. This difference of ₹ 25 is because under semi-annual compounding, the interest for first 6 months earns interest in the second 6 months.

The generalized formula for these shorter compounding periods is:

$$FV_n = PV\left(1+\frac{k}{m}\right)^{m\times n}$$

Where,

FV_n = Future value after 'n' years

PV = Cash flow today

k or i = Nominal interest rate per annum

m = Number of times compounding is done during a year

n = Number of years for which compounding is done.

Illustration 6. Under the Vijaya Cash Certificate scheme of Vijaya Bank, deposits can be made for periods ranging from 6 months to 10 years. Every quarter, interest will be added on to the principal. The rate of interest applied is 9 per cent p.a. for periods from 12 to 23 months and 10 per cent p.a. for periods from 24 to 120 months.

Solution: An amount of ₹ 1,000 invested for 2 years will grow to

$$FV_n = PV\left(1+\frac{k}{m}\right)^{m\times n}$$

where m = Frequency of compounding during a year

$$= 1{,}000\left(1+\frac{0.10}{4}\right)^{8}$$

$$= 1{,}000(1.025)^{8}$$

$$= 1{,}000 \times 1.2184$$

$$= ₹\ 1{,}218$$

Illustration 7. Under the Andhra Bank's Cash Multiplier Scheme, deposits can be made for periods ranging from 3 months to 5 years. Every quarter, interest is added to the principal. The applicable rate of interest is 9% for deposits less than 23 months and 10% for periods more than 24 months. What will the amount of ₹ 10,000 today be after 2 years?

Solution: $FV_n = PV(1 + i/m)^{m \times n}$

$$= 1{,}000\ (1 + 0.10/4)^{4 \times 2}$$

$$= 1{,}000\ (1 + 0.10/4)^{8}$$

$$= ₹\ 12{,}180$$

Effective vs. Nominal Rate of Interest: We have seen above that the accumulation under the semi-annual compounding scheme exceeds the accumulation under the annual compounding scheme by ₹ 25. This means that while under annual compounding scheme, the nominal rate of interest is 10 per cent per annum, under the scheme where compounding is done semi-annually, the principal amount grows at the rate of 10.25 per cent per annum. This 10.25 per cent is called the effective rate of interest which is the rate of interest per annum under annual compounding that produces the same effect as that produced by an interest rate of 10 per cent under semi-annual compounding.

The general relationship between the effective and nominal rates of interest is as follows:

$$r = \left(1 + \frac{k}{m}\right)^m - 1$$

where, r = Effective rate of interest

k = Nominal rate of interest

m = Frequency of compounding per year

Illustration 8. Find out the effective rate of interest, if the nominal rate of interest is 12 per cent and is quarterly compounded.

Solution: Effective rate of interest

$$r = \left(1 + \frac{k}{m}\right)^m - 1$$

$$r = \left(1 + \frac{0.12}{4}\right)^4 - 1$$

$= (1 + 0.03)^4 - 1 = 1.126 - 1$

$= 0.126 = 12.6\%$ p.a.

Future Value of Multiple Flows: Suppose we invest ₹ 1,000 now (beginning of year 1), ₹ 2,000 at the beginning of year 2 and ₹ 3,000 at the beginning of year 3, how much will these flows accumulate to at the end of year 3 at a rate of interest of 12 per cent per annum? This problem can be represented on the time line as follows:

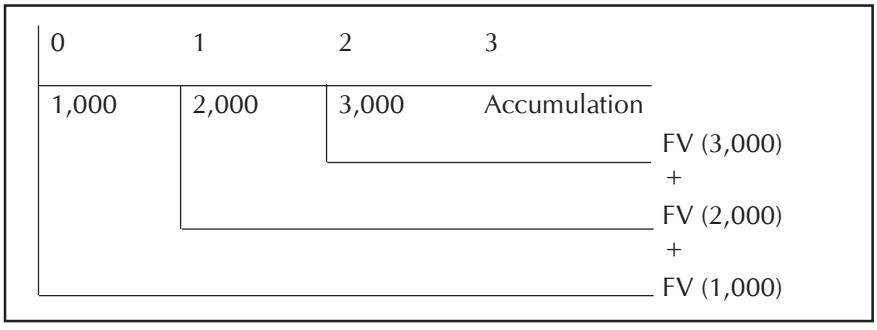

Figure 3.4: Compounding Process for Multiple Flows

To determine the accumulated sum at the end of year 3, we have to just add the future compounded values of ₹ 1,000, ₹ 2,000 and ₹ 3,000 respectively *.

FV ₹ 1,000 FV ₹ 2,000 FV ₹ 3,000

At k = 0.12, the above sum is equal to

$= ₹ 1{,}000 \times FVIF_{12,3}\ 2{,}000 \times FVIF_{12,2}\ 3{,}000 \times FVIF_{12,1}$

$= ₹ [1{,}000 \times 1.405\ 2{,}000 \times 1.254\ 3{,}000 \times 1.120] = ₹ 7{,}273$

Therefore, to determine the accumulation of multiple flows as at the end of a specified time horizon, we have to find out the accumulations of each of these flows using the appropriate FVIF and sum up these accumulations. This process can get tedious if we have to determine the accumulation of multiple flows over a long period of time, for example, the accumulation of a recurring deposit of ₹ 100 per month for 60 months at a rate of 1 per cent per month. In such cases a short cut method can be employed provided the flows are of equal amounts. This method is discussed in the following section.

Illustration 9. We have considered only single payment made once and its accumulation effect. An investor may be interested in investing money in installments and wish to know the value of his savings after n years. For example, Mr. Madan invests ₹ 500, ₹ 1,000, ₹ 1,500, ₹ 2,000 and ₹ 2,500 at the end of each year for 5 years. Calculate the value at the end of 5 years compounded annually if the rate of interest is 5% p.a.

Solution:

End of Year	Amount Investment	Number of Years Compounded	Compounded Interest Factor from Tables	FV in ₹
1	₹ 500	4	1,216	608
2	₹ 1,000	3	1,158	1,158
3	₹ 1,500	2	1,103	1,654
4	₹ 2,000	1	1,050	2,100
5	₹ 2,500	0	1,000	2,500
Amount at the end of 5th Year				₹ 8,020

Future Value of Annuity: Annuity is the term used to describe a series of periodic flows of equal amounts. These flows can be either receipts or payments. For example, if you are required to pay ₹ 200 per annum as life insurance premium for the next 20 years, you can classify this stream of payments as an annuity. If the equal amounts of cash flow occur at the end of each period over the specified time horizon, then this stream of cash flows is defined as a regular annuity or deferred annuity. When cash flows occur at the beginning of each period the annuity is known as an annuity due.

The future value of a regular annuity for a period of n years at a rate of interest 'k' is given by the formula:

$$FVA_n = A(1 + k)^{n-1} + A(1 + k)^{n-2} + A(1 + k)^{n-3} + \ldots\ldots + A$$

which reduces to

$$FVA_n = A\left[\frac{(1+k)^n - 1}{k}\right]$$

where, A = Amount deposited/invested at the end of every year for n years

k or i = Rate of interest (expressed in decimals)

n = Time horizon

FVA_n = Accumulation at the end of n years

The expression $\left[\frac{(1+k)^n - 1}{k}\right]$ is called the Future Value Interest Factor for Annuity (FVIFA,

*Candidates who would like to know whether there is any short cut for evaluating $(1 + k)^n$ for values of 'k' not found in the table, are informed that there is no short cut method except using logarithms or the X^Y function found in scientific calculators.

Illustration 10. M. Ram Kumar deposits ₹ 3,000 at the end of every year for 5 years into his account for 5 years, interest being 5% compounded annually. Determine the amount of money he will have at the end of the 5th year.

End of Year	Amount Investment	Number of Years Compounded	Compounded Interest Factor from Tables	FV in ₹
1	₹ 2,000	4	1,216	2,432
2	₹ 2,000	3	1,158	2,316
3	₹ 2,500	2	1,103	2,206
4	₹ 2,000	1	1,050	2,100
5	₹ 2,500	0	1,000	2,000
Amount at the end of 5th Year				₹ 11,054

OR Using formula and the tables we can find that: = 2000 FVIFA(5%, 5y)

= 2,000 × 5.526

= **₹ 11,052**

We notice that we can get the accumulations at the end of n period using the tables. Calculations for a long time horizon are easily done with the help of reference tables. Annuity tables are widely used in the field of investment banking as ready reckoners.

Illustration 11. Calculate the value of an annuity flow of ₹ 5,000 done on a yearly basis for 5 years, yielding an interest of 8% p.a.

Solution: = 5000 FVIFA(8%, 5y)

= 5,000 × 5.867

= ₹ 29,335

Illustration 12. Under the recurring deposit scheme of the Vijaya Bank, a fixed sum is deposited every month on or before the due date opted for 12 to 120 months according to the convenience and needs of the investor. The period of deposit, however, should be in multiples of 3 months only. The rate of interest applied is 9 per cent p.a. for periods from 12 to 24 months and 10 per cent p.a. for periods from 24 to 120 months and is compounded at quarterly intervals.

Solution: Based on the above information the maturity value of a monthly installment of ₹ 5 for 12 months can be calculated as below:

Amount of deposit = ₹ 5 per month

Rate of interest = 9 per cent p.a. compounded quarterly

Effective rate of interest per annum = $\left(1+\frac{0.09}{4}\right)^4 - 1 = 0.0931$

Rate of interest per month $= (r + 1)^{1/m} - 1$

$= (1 + 0.0931)^{1/12} - 1$

$= 1.0074 - 1 = 0.0074 = 0.74\%$

Maturity value can be calculated using the formula

$$FVA_n = A\left\{\frac{(1+k)^n - 1}{k}\right\}$$

$$= 5\left\{\frac{(1+0.0074)^{12} - 1}{0.0074}\right\}$$

= 5 × 12.50 = ₹ 62.50

If the payments are made at the beginning of every year, then the value of such an annuity called annuity due is found by modifying the formula for annuity regular as follows:

FVA_n (due) = A (1 + k) $FVIFA_{k,n}$

Illustration 13. Under the Jeevan Mitra Plan offered by Life Insurance Corporation of India, if a person is insured for ₹ 10,000 and if he survives the full term, then the maturity benefits will be the basic sum of ₹ 10,000 assured plus bonus which accrues on the basic sum assured. The minimum and maximum age to propose for a policy is 18 and 50 years respectively.

Let us take two examples, one of a person aged 20 and another of 40 years old to illustrate this scheme.

The person aged 20, enters the plan for a policy of ₹ 10,000. The term of policy is 25 years and the annual premium is ₹ 41.65. The person aged 40, also proposes for the policy of ₹ 10,000 and for 25 years and the annual premium he has to pay comes to ₹ 57. What are the rates of return enjoyed by these two persons?

Solution: Rate of return enjoyed by the person of 20 years of age

Premium = ₹ 41.65 per annum

Term of Policy = 25 years

Maturity Value = ₹ 10,000 + bonus which can be overlooked as it is a fixed amount and does not vary with the term of policy.

We know that the premium amount when multiplied by FVIFA factor will give us the value at maturity.

i.e., $P \times (1 + k)\ FVIFA(k,n) = MV$

where,

P = Annual premium

n = Term of policy in years

k = Rate of return

MV = Maturity value

Therefore,

$41.65 \times (1 + k)\ FVIFA\ (k,25) = 10,000$

$(1 + k)\ FVIFA\ (k,25) = 240.01$

From table 2 at the end of the book, we can find that

$(1 + 0.14)\ FVIFA\ (14,25) = 207.33$

i.e., $(1.14)\ FVIFA\ (14,25) = 1.14 \times 181.871 = 207.33$

and

$(1 + 0.15)\ FVIFA\ (15,25) = 244.71$

i.e., $(1.15)\ FVIFA\ (15,25) = 1.15 \times 212.793 = 244.71$

By interpolation:

$$k = 14\% + (15\% - 14\%) \times \frac{240.01 - 207.33}{244.71 - 207.33}$$

$$= 14\% + 1\% \times \frac{33.68}{33.38}$$

$$= 14\% + 0.87\% = 14.87\%$$

Rate of return enjoyed by the person aged 40

Premium = ₹ 57 per annum

Term of Policy = 25 years

Maturity Value = ₹ 10,000

Therefore, 57 × (1 + k) FVIFA (k,25) = 10,000

(1 + k) FVIFA (k,25) = 175.44

From table 2 at the end of the book, we can find that

(1 + k) FVIFA (13%, 25) = 175.87

i.e., (1.13) (155.62) = 175.87

i.e., k = 13% (approx.)

Here we find that the rate of return enjoyed by the 20-year old person is greater than that of the 40-year old person by about 2 per cent in spite of the latter paying a higher amount of annual premium for the same period of 25 years and for the same maturity value of ₹ 10,000. This is due to the coverage for the greater risk in the case of the 40-year old person.

Now that we are familiar with the computation of future value, we will get into the mechanics of computation of present value.

Sinking Fund Factor

We have the equation

$$FVA = A\left[\frac{(1+k)^n - 1}{k}\right]$$

We can rewrite it as

$$A = FVA\left[\frac{k}{(1+k)^n - 1}\right]$$

The expression $\left[\frac{k}{(1+k)^n - 1}\right]$ is called the Sinking Fund Factor. It represents the amount that has to be invested at the end of every year for a period of "n" years at the rate of interest "k", in order to accumulate Re. 1 at the end of the period.

Discounting or Present Value of a Single Flow

Discounting as explained earlier is an alternative approach for reckoning the time value of money. Using this approach, we can determine the present value of a future cash flow or a stream of future cash flows. The present value approach is the commonly followed approach for evaluating the financial viability of projects.

If we invest ₹ 1,000 today at 10 per cent rate of interest for a period of 5 years, we know that we will get ₹ 1,000 × FVIF (10,5) = ₹ 1,000 × 1.611 = ₹ 1,611 at the end of 5 years. The sum of ₹ 1,611 is called the accumulation of ₹ 1,000 for the given values of 'k' and 'n'. Conversely,

the sum of ₹ 1,000 invested today to get ₹ 1,611 at the end of 5 years is called the present value of ₹ 1,611 for the given values of 'k' and 'n'. It, therefore, follows that to determine the present value of a future sum we have to divide the future sum by the FVIF value corresponding to the given values of 'k' and 'n' i.e. present value of ₹ 1,611 receivable at the end of 5 years at 10 per cent rate of interest.

$$= ₹ \frac{1,611}{FVIF(10,5)} = ₹ \frac{1,611}{1.611} = ₹ 1,000$$

In general the present value (PV) of a sum (FV_n) receivable after n years at a rate of interest (k) is given by the expression.

$$PV = \frac{FV_n}{FVIF(k, n)} = \frac{FV_n}{(1+k)^n}$$

The inverse of FVIF(k,n) is defined as PVIF(k,n) (Present Value Interest Factor for k,n). Therefore, the above equation can be written as

$$PV = FV_n \times PVIF(k,n)$$

Therefore to determine the present value of a future sum, we have to just locate the PVIF factor for the given values of k and n and multiply this factor value with the given sum. Since PVIF (k,n) represents the present value of Re. 1 receivable after n years at a rate of interest k, it is obvious that PVIF values cannot be greater than one. The PVIF values for different combinations of k and n are given in table 3 at the end of this book.

For instance, what is the present value of ₹ 1,000 receivable after 8 years. If the rate of discount is 15%.

P.V. = 1,000 $\{1/1+0.15))^8\}$ = 1,000 × 0.327 = ₹ 327.

Illustration 14. Calculate the PV of an annuity of ₹ 500 received annually for 4 year, when discounting factor is 10%.

End of Year	Cash Inflows	PV Factor	PV in ₹
1	₹ 500	0.909	454
2	₹ 500	0.827	413
3	₹ 500	0.751	375
4	₹ 500	0.683	341

Present Value of an annuity ₹ 1,585.

OR by directly looking at the table we can calculate: = 500 × PVIFA(10%, 4y)

= 500 × 3.170

= ₹ 1,585

Illustration 15. Find out the present value of an annuity of ₹ 10,000 over 3 years when discounted at 5%.

Solution: = 10,000 × PVIFA(5%, 3y)

= 10,000 × 2.773

= ₹ 27,730

Illustration 16. The cash certificates of Andhra Bank are a term deposit scheme under reinvestment plan. Interest on deposit money earns interest as it is reinvested at quarterly rests. These deposits suit depositors from lower and middle income groups, since the small odd sums invested grow into large amounts over a period of time @ 12% p.a. If ₹ 100 certificate is available at ₹ 90, then should we buy or not?

Solution: Given an interest rate of 12 per cent p.a. on a certificate having a value of ₹ 100 after 1 year, the issue price of the cash certificate can be calculated as below.

The effective rate of interest has to be calculated first.

$$r = \left(1+\frac{k}{m}\right)^{m} - 1$$

$$r = \left(1+\frac{0.12}{4}\right)^{4} - 1 = 12.55\%$$

The issue price of the cash certificate is

$$PV = \frac{FV_n}{(1+k)^n}$$

$$= \frac{100}{(1+0.1255)^1} = ₹\ 88.85$$

$\therefore$ we will not buy above certificate @ ₹ 90.

Illustration 17. Pragati cash certificate scheme of Syndicate Bank is an ideal scheme for all classes of people under different income groups. A small odd sum can be invested for a period ranging from 1 to 10 years. The certificates are issued in convenient denominations of ₹ 25, ₹ 100, ₹ 1,000, and ₹ 1,00,000. The rate of interest is 12 per cent p.a. compounded quarterly. If ₹ 1,00,000 certificate is available at ₹ 30,000, then should we buy such certificate or not?

Solution: To calculate the issue price of a certificate of ₹ 1,00,000 to be received after 10 years, the following formula can be used

$$PV = \frac{FV_n}{(1+k)^n}$$

Firstly, the effective rate of interest has to be calculated.

$$r = \left(1+\frac{0.12}{4}\right)^{4} = 12.55\%$$

The issue price of the cash certificate can now be calculated as:

$$PV = \frac{FV_n}{(1+k)^n}$$

$$= \frac{1,00,000}{(1+0.1255)^{10}} = ₹\ 30,658$$

As present value of the certificate is ₹ 30,658 and it is available at ₹ 30,000. Therefore, we should buy such certificate, and we will make a profit of ₹ 658.

Present Value of Uneven Multiple Flows

Suppose a project involves an initial investment of ₹ 10 lakh and generates net inflows as follows:

End of Year -> 1 ₹ 2 lakh

-> 2 ₹ 4 lakh

-> 3 ₹ 6 lakh

What is the present value of the future cash inflows? To determine it, we have to first define the relevant rate of interest. The relevant rate of interest as we shall see later, will be the cost of the funds invested. Suppose, we assume that this cost is 12 per cent p.a. then we can determine the present value of the cash flows using the following two-step procedure:

Step 1

Evaluate the present value of cash inflow independently. In this case, the present values will be as follows:

Year	Cash Flow (₹ in lakh)	Present Value (₹ in lakh)
1	2	2 × PVIF (12,1) = 2 × 0.893 = 1.79
2	4	4 × PVIF (12,2) = 4 × 0.797 = 3.19
3	6	6 × PVIF (12,3) = 6 × 0.712 = 4.27

Step 2

Aggregate the present values obtained in Step 1 to determine the present value of the cash flow stream. In this case the present value of the cash inflows associated with the project will be ₹ (1.79 + 3.19 + 4.27) lakh = ₹ 9.25 lakh.

A project is said to be financially viable if the present value of the cash inflows exceeds the present value of the cash outflow. In this case, the project is not financially viable because the present value of the net cash inflows (₹ 9.25 lakh) is less than the initial investment of ₹ 10 lakh. The difference of ₹ 0.75 lakh is called the net present value.

Like the procedure followed to obtain the future value of multiple cash flows, the procedure adopted to determine the present value of a series of future cash flows can prove to be cumbersome, if the time horizon to be considered is quite long. These calculations can,

however, be simplified if the cash flows occurring at the end of the time periods are equal. In other words, if the stream of cash flows can be regarded as a regular annuity or annuity due, then the present value of this annuity can be determined using an expression similar to the FVIFA expression.

Illustration 18.

Year	Cash flows ₹
1	1,000
2	2,000
3	3,000
4	4,000
5	5,000

Present value at 10% discount factor is .909, .826, .751, .683, . 621 for lst, 2nd, 3rd, 4th and 5th year.

Find out the present value of cash flows.

Solution:

Year	Cash flows ₹	PV factor	Present value ₹
1	1.000	.909	909
2	2,000	.826	1,652
3	3,000	.751	2,253
4	4,000	.683	2,732
5	5.000	.621	3,105
			10,651

Illustration 19:

Find out value of the cash flow.

Year	Cash flows ₹
1	500
2	1,000
3	1,500
4	2,000
5	2,500

Discounted rate = 10%

Solution:

Year end	Cash Flows	Present Value Factor	Present Value
1	500	0.909	454.5
2	1,000	0.826	826.0
3	1,500	0.751	1,126.5
4	2,000	0.683	1,366.0
5	2,500	0.621	1,552.5
			5,325.5

Illustration 20. An investor will receive ₹ 10,000, ₹ 15,000, ₹ 8,000, ₹ 11,000 and ₹ 4,000 respectively at the end of each of 5 years. Find out the present value of this stream of uneven cash flows, if the investor's interest rate is 8%.

PV = $10,000/(1 + 0.08) + 15,000/(1 + 0.08)^2 + 8,000/(1 + 0.08)^3 + 11,000/(1 + 0.08)^4 + 4,000/(1 + 0.08)^5$

= ₹ 39,276 **Or**

PV = 10,000 PVIF(8,1) + 15,000 PVIF(8,2) + 8,000 PVIF(8,3) + 11,000 PVIF(8,4) + 4,000 PVIF(8,5)

= 10,000 × 0.926 + 15,000 × 0.857 + 8,000 × 0.794 + 11,000 × 0.735 + 4,000 × 0.681

= ₹ 39,276

Present Value of an Annuity

The present value of an annuity 'A' receivable at the end of every year for a period of n years at a rate of interest k is equal to

$$PVA_n = \frac{A}{(1+k)} + \frac{A}{(1+k)^2} + \frac{A}{(1+k)^3} + ... + \frac{A}{(1+k)^n};$$

which reduces to

$$PVA_n = A \times \left[\frac{(1+k)^n - 1}{k(1+k)^n}\right]$$

The expression $\left[\frac{(1+k)^n - 1}{k(1+k)^n}\right]$ is called the PVIFA (Present Value Interest Factor Annuity) and it represents the present value of a regular annuity of Re. 1 for the given values of k and n. The values of PVIFA (k,n) for different combinations of 'k' and 'n' are given in Table 4 given at the end of the book. It must be noted that these values can be used in any present value problem only if the following conditions are satisfied: (a) the cash flows are equal; and (b) the cash flows occur at the end of every year. It must also be noted that PVIFA (k,n) is not the inverse of FVIFA (k,n) although PVIF (k,n) is the inverse of FVIF (k,n). The following illustration illustrates the use of PVIFA tables for determining the present value.

Illustration 21. The Swarna Kalash Yojana at rural and semi-urban branches of SBI is a scheme open to all individuals/firms. A lump sum deposit is remitted and the principal is received with interest at the rate of 12 per cent p.a. in 12 or 24 monthly installments. The interest is compounded at quarterly intervals.

Solution: The amount of initial deposit to receive a monthly installment of ₹ 100 for 12 months can be calculated as below:

Firstly, the effective rate of interest per annum has to be calculated.

$$r = \left(1+\frac{k}{m}\right)^m - 1$$

$$= \left(1+\frac{0.12}{4}\right)^4 - 1 = 12.55\%$$

After calculating the effective rate of interest per annum, the effective rate of interest per month has to be calculated which is nothing but

$(1.1255)^{1/12} - 1 = 0.00990$

The initial deposit can now be calculated as below:

$$PVA_n = A \times \left[\frac{(1+k)^n - 1}{k(1+k)^n}\right]$$

$$= 100 \times \left[\frac{(1+0.00990)^{12} - 1}{0.00990(1+0.00990)^{12}}\right]$$

$$= 100 \times \left[\frac{0.1255}{0.01114}\right]$$

$= 100 \times 11.26 =$ ₹ 1,126.

Illustration 22. The annuity deposit scheme of SBI provides for fixed monthly income for suitable periods of the depositor's choice. An initial deposit has to be made for a minimum period of 36 months. After the first month of the deposit, the depositor receives monthly installments depending on the number of months he has chosen as annuity period. The rate of interest is 11 per cent p.a. which is compounded at quarterly intervals.

Solution: If an initial deposit of ₹ 4,610 is made for an annuity period of 60 months, the value of the monthly annuity can be calculated as below.

Firstly, the effective rate of interest per annum has to be calculated

$$r = \left(1+\frac{k}{m}\right)^m - 1$$

$$= \left(1+\frac{0.11}{4}\right)^4 - 1 = 11.46\%$$

After calculating the effective rate of interest per annum, the effective rate of interest per month has to be calculated which is nothing but

$$(1.1146)^{1/12} - 1 = 0.00908$$

The monthly annuity can now be calculated as

$$PVA_n = A \times \left[\frac{(1+k)^n - 1}{k(1+k)^n}\right]$$

$$4{,}610 = A \times \left[\frac{(1+0.00908)^{60} - 1}{0.00908(1.00908)^{60}}\right]$$

$$4{,}610 = A \times = 99.8833$$

$$\Rightarrow A = 99.8833$$

$$A = ₹\ 100$$

Capital Recovery Factor: Manipulating the relationship between PVA_n, A, k & n we get an equation:

$$A = PVA_n\left[\frac{(1+k)^n - 1}{k(1+k)^n}\right] \qquad \text{or} \qquad \frac{\text{Loan Amount}}{\text{PVIFA}\,(k_d, n)}$$

$\left[\frac{(1+k)^n - 1}{k(1+k)^n}\right]$ is known as the capital recovery factor.

Illustration 23. A loan of ₹ 1,00,000 is to be repaid in five equal annual installments. If the loan carries a rate of interest of 14 per cent p.a. the amount of each installment can be calculated as below.

Solution: If R is defined as the equated annual installment, we are given that

$$R \times \text{PVIFA}\,(14\%, 5) = ₹\ 1{,}00{,}000$$

$$\text{Therefore, } R = \frac{₹\ 1{,}00{,}000}{\text{PVIFA}\,(14\%, 5)}$$

$$= \frac{₹\ 1{,}00{,}000}{3.433} = ₹\ 29{,}129$$

Notes:

1. We have introduced in this example the application of the inverse of the PVIFA factor which is called the capital recovery factor. The application of the capital recovery factor helps in answering questions like:
   - What should be the amount paid annually to liquidate a loan over a specified period at a given rate of interest?
   - How much can be withdrawn periodically for a certain length of time, if a given amount is invested today?

2. In this example, the amount of ₹ 29,129 represents the sum of the principal and interest components. To get an idea of the break-up of each installment between the principal and interest components, the loan repayment schedule is given below:

Year (A)	Equated Annual Installment (B) (₹)	Interest Content of (B) (C) (₹)	Capital Content of (B) [(D) = (B – C)] (₹)	Loan Outstanding After Payment (E) (₹)
0	–	–	–	1,00,000
1	29,129	14,000	15,129	84,871
2	29,129	11,882	17,247	67,624
3	29,129	9,467	19,662	47,962
4	29,129	6,715	22,414	25,548
5	29,129	3,577	25,552	–

The interest content of each installment is obtained by multiplying interest rate with the loan outstanding at the end of the immediately preceding year.

As can be observed from this schedule, the interest component declines over a period of time whereas the capital component increases. The loan outstanding at the end of the penultimate year must be equal to the capital content of the last installment but in practice there will be a marginal difference on account of rounding-off errors.

3. The equated annual installment method is usually adopted for fixing the loan ment schedule in a hire purchase transaction. But the financial institutions in India repaylike IDBI, IFCI and ICICI do not follow this scheme of equal periodic amortization. Instead, they stipulate that the loan must be repaid in equal installments. According to this scheme, the principal component of each payment remains constant and the total debt-servicing burden (consisting of principal repayment and interest payment) declines over time.

Sinking Fund: Sinking fund is a fund which is created out of fixed payments each period to accumulate to a future sum after a specified period. The sinking fund factor is useful in determining the annual amount to be put in a fund to repay bonds or debentures or to purchase a fixed asset or a property at the end of a specified period.

$$\mathbf{A = FVA \times i/\{(1 + i)^n - 1\}}$$

$i/\{(1+i)^n-1\}$ is called the *Sinking Fund Factor*.

Present Value of Perpetuity

An annuity of an infinite duration is known as perpetuity. The present value of such perpetuity can be expressed as follows:

$$P = A \times PVIFA_k$$

Where, P = Present value of a perpetuity

A = Constant annual payment

$PVIFA_{k,}$ = Present value interest factor for a perpetuity

Therefore, The value of $PVIFA_k$ is

$$\sum_{t=1}^{\infty} \frac{1}{(1+k)^t} = \frac{1}{k} \quad \text{or} \quad \frac{FV}{Interest}$$

We can say that PV interest factor of a perpetuity is simply one divided by interest rate expressed in decimal form. Hence, PV of a perpetuity is simply equal to the constant annual payment divided by the interest rate.

Illustration 24. If the principal of a college wants to institute a scholarship of ₹ 5,000 to a meritorious student in finance every year, find out the PV of investment which would yield ₹ 5,000 in perpetuity, discounted at 10%.

Solution: P = A/i

= 5,000/0.10

= ₹ 50,000

This means he should invest ₹ 50,000 to get an annual return of ₹ 5,000.

Illustration 25. What is the future value of a regular annuity of ₹ 1.00 earning a rate of 12% interest p.a. for 5 years?

Solution: 1 × FVIFA(12%, 5y) = 1 × 6.353 = ₹ 6.353

Illustration 26. If a borrower promises to pay ₹ 20,000 eight years from now in return for a loan of ₹ 12,550 today, what is the annual interest being offered?

Solution: 20000 × PVIF(k%, 8y) = ₹ 12,550 K is approximately 6%.

Illustration 27. A loan of ₹ 5,00,000 is to be repaid in 10 equal installments. If the loan carries 12% interest p.a. what is the value of one installment?

Solution: A × PVIFA(12%, 10y) = 5,00,000 So A = 5,00,000/5.650 = ₹ 88,492.

Illustration 28. A person deposits ₹ 25,000 in a bank that pays 6% interest half-yearly. Calculate the amount at the end of 3 years.

Solution: 25,000 × (1+0.06)3 × 2 = 25,000 × 1.194 = ₹ 29,850

Illustration 29. Find the present value of ₹ 1,00,000 receivable after 10 years if 10% is the time preference for money.

Solution: 1,00,000 × (0.386) = ₹ 38,600

Illustration 30. Ms Sushma wants to find out the present value of ₹ 50,000 to be received 5 years from now, at 10% rate of interest. We have to see 10% column of the 5th year in the Present Value tables. The relevant present valeu factor is 0.621.

Solution:

PV = A (PVIF)

Therefore, Present Value = 50,000 (0.6210)

= 31,040

Illustration 31. You deposit ₹ 10,000 annually in a bank for 3 years and your deposits earn a compound interest rate of 10%. What will be an annuity at the end of 3 years?

Solution:

₹ 10,000 $(1.10)^2$ + ₹ 10,000 (1.10) + ₹ 10,000

= ₹ 10,000 (1.21) + ₹ 10,000 (1.10) + ₹ 10,000

= 12,100 + 11,000 + 10,000

= ₹ 33,100

Illustration 32: You deposit ₹ 30,000 annually in a bank for 8 years and your deposit earns a compound interest rate of 12%. What will be annuity at the end of 8 years?

Solution:

$$FVA_n = A\frac{[(1+r)^n - 1]}{r}$$

FVAg = 30,000 912.3]

= ₹ 3,69,000

Illustration 33. Suppose you have decided to deposit ₹ 30,000 per year in your Public Provident Fund account for 30 years. What will be accumulated amount in your Public Provident Fund account at the end of 30 years if the interest rate is 11 %?

Solution: The accumulated sum will be :

$$= ₹\ 30{,}000\ \frac{[(1.11)^{30} - 11}{.11}$$

= ₹ 30,000 [199.02]

= ₹ 59,70,600

Illustration 34. You want to buy a house after 5 years when it is expected to cost ₹ 50 lakhs. How much should you save annually if your savings earn a compound interest of 10%?

Solution:

$$FVAn = A\frac{[(1+r)^n - 1]}{r}$$

50,00,000= A [6.105]

$$A = \frac{50,00,000}{6,105}$$

$$= ₹\ 8,19,000$$

FINDING THE INTEREST RATE

Illustration 35. A finance company advertises that it will pay a lump sum of ₹ 8,000 at the end of 6 years to Investors who deposit annually ₹ 1,000 for 6 years. What interest rate is implicit in this offer?

Solution: Lump sum amount = ₹ 8,000.

Read the row corresponding to 6 years until you find value close to 8,000. Doing so, we find that FVIFA 12% 8.115.

So we conclude that the interest rate is slightly below 12%.

Illustration 36. A firm decides to make a deposit of ₹ 10,000 at the end of each year, for the next 10 years at 10% rate of interest. What will be the total cumulative deposit at the end of 10th year from today? The firm may also be interested to know the total deposit if the rate of interest is 9% or 11% in this case.

Solution:

Calculation for 10%:

$$FVA_n = A\frac{[(1+r)^n - 11}{r}$$

$$= 10,000 \times 15.937$$

$$= ₹\ 1,59,370.$$

Calculation for 9%:

$$FVA_n = 10,000 \times 15.193$$

$$= ₹\ 1.51.930$$

Calculation for 11 %:

$$FVA_n = 10,000 \times 16.722$$

$$= ₹\ 1,67,220.$$

Illustration 37. You expect to receive ₹ 1,000 annually for 2 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%?

Solution:

$$\text{1st year} = 1,000\left[\frac{1}{1.10}\right] = 1,000 \times 0.9091 \quad = 909$$

2nd year = $1{,}000 \left[\frac{1}{1.10}\right]^2 = 1{,}000 \times 0.8264 = 826.4$

Total = 1,735.4

Illustration 38. A student is awarded a scholarship and two options are placed before him.

(a) To receive ₹ 1,100 now.

(b) To receive ₹ 100 pm at the end of each of next 12 months. Which option be chosen if the rate of interest is 12% p.a.?

Solution:

Option I :

The amount of ₹ 1,100 receivable now is already expressed in the present money and therefore does not require any adjustment.

Option II:

PV = A × PVAF(1%, 12)

= 100 × 11.255

= ₹ 1,125.50.

Since the present value in Option II is higher than the present value in Option I, the student should choose Option II.

Illustration 39. Find out the present value of an investment which is expected to give a return of ₹ 2.500 p.a. indefinitely and the rate of interest is 12% p.a.

Solution:

PV_P = Annual cash flow/r

= ₹ 2,500 I 0.12

= ₹ 20,833.

Illustration 40. A finance company makes an offer to deposit a sum of ₹ 1,100 and then receive a return of ₹ 80 p.a. perpetually. Should this offer be accepted if the rate of interest is 8%. Will the decision change if the rate of interest is 5%?

Solution:

In this case, a person should accept the offer only if the PV of the perpetuity is more than the initial deposit of ₹ 1,100.

If the rate of interest is 8%.

PVP = Annual cash flow/ r

= ₹ 80 1.08

= ₹ 1,000

If the rate of interest is 5%, then

PVP = Annual cash flow/r

= ₹ 801.05

= ₹ 1,600.

INTERNAL RATE OF RETURN (IRR)

This is the second time adjusted rate of return method for appraising capital expenditure decisions. It is the discount rate at which the aggregate present value of inflows equal the aggregate present value of outflows i.e. the rate at which NPV = 0.

In the NPV method, the discount rate is normally equally to the cost of capital which is external to the project under consideration. But in this method, the discount rate depends on the initial outlay and cash inflows of the project under consideration. It is therefore, called the Internal Rate of Return. The IRR, once calculated is then compared to the required rate of return known as cut-off rate. The project is accepted if the IRR exceeds the cut-off rate. Otherwise, it is rejected.

Merits:

(a) It also considers the time value of money.

(b) It considers the cash flows over the entire life of a project.

(c) It does not use the cost of capital to determine the present value. It itself provides a rate of return indicative of the profitability of the proposal.

(d) It would also lead to a rise in share prices and to maximization of shareholder's wealth in the same way as NPV method.

Limitations:

(a) The procedure for its calculation is complicated and at times tedious.

(b) Sometimes it leads to multiple rates which further complicate its calculation.

(c) In case of more than one project, the project with the maximum IRR may be selected which may not turn out to be one which is the most profitable in the long run.

(d) Projects selected on the basis of higher IRR may not be profitable.

(e) Unless the life of the project can be accurately estimated, assessment of cash flows cannot be done.

Illustration 41. A company is considering which of two mutually exclusive projects it should undertake. The Finance Director thinks that the project with the higher NPV should be chosen whereas the Managing Director thinks that the one with the higher IRR should be undertaken especially as both projects have the same initial outlay and length of life. The company anticipates a cost of capital of 10% and the net after-tax cash flows of the projects are as follows:

Year	0	1	2	3	4	5
(Cash Flows Fig. '000)						
Protect X	(200)	35	80	90	75	20
Protect Y	(200)	218	10	10	4	3

Required:

(a) Calculate the NPV and IRR of each project.

(b) State, with reasons, which project you would recommend.

The discount factors are as follows:

Year	0	1	2	3	4	5
Discount Factors :						
(10%)	1	0.91	0.83	0.75	0.68	0.62
(20%)	1	0.83	0.69	0.58	0.48	0.41

Solution:

(a) Calculation of the NPV and IRR of each project:

NPV of Project X

Years	Cash Flows	Discount Factors @ 10%	Discounted Values	Discount Factors @20%	Discounted Values
0	(200)	—	—	—	—
1	35	0.91	31.85	0.83	29.05
2	80	0.83	66.40	0.69	55.20
3	90	0.75	67.50	0.58	52.20
4	75	0.68	51.00	0.48	36.00
5	20	0.62	12.40	0.41	8.20
			229.15		180.65
NPV			+29.15		–19.35

IRR of Project X:

At 20% NPV is –19.35

At 10% NPV is + 29.15

$$\text{IRR} = 10 + \frac{29.15}{29.15 + 19.35} \times 10$$

$$= 10 + \frac{29.15}{48.50} \times 10$$

$$= 16.01\%$$

NPV of Project Y

Years	Cash Flows	Discount Factors @ 10%	Discounted Values	Discount Factors @20%	Discounted Values
0	(200)	—	—	—	—
1	218	0.91	198.38	0.83	180.94
2	10	0.83	8.30	0.69	6.90
3	10	0.75	7.50	0.58	5.80
4	4	0.68	2.72	0.48	1.92
5	3	0.62	1.86	0.41	1.23
			218.76		196.79
NPV			+ 18.76		–3.21

IRR of Project Y:

At 20% NPV is - 3.21

At 10% NPV is + 18.76

$$\text{IRR} = 10 + \frac{18.76}{18.76 + 3.21} \times 10$$

$$= 10 + \frac{18.76}{21.97} \times 10$$

$$= 18.54\%$$

Both the projects are acceptable because they generate the positive NPV at the company's cost of capital at 10%. However, the company will have to select Project X because it has a higher NPV. If the company follows IRR method, then Project Y should be selected because of higher NPV. If the company follows IRR method, then Project Y should be selected because of higher internal rate of return (IRR). But when NPV and IRR give contradictory results, a project with higher NPV is generally preferred because of higher return in absolute terms. Hence, Project X should be selected.

VALUATION OF BONDS AND SHARES

Introduction

Valuation is the process of linking risk with returns to determine the worth of an asset. Assets can be real or financial; securities are called financial assets, physical assets are real assets. The ultimate goal of any individual investor is maximization of profits. Investment management is a continuous process requiring constant monitoring. The value of an asset depends on the cash flow it is expected to provide over the holding period. The fact that as on date there is no method by which prices of shares and bonds can be accurately predicted should be kept in mind by an investor before he decides to take an investment decision. The present chapter will help us to know why some securities are priced higher than others. We can design our investment structure by exploiting the variables to maximize our returns.

Ordinary shares are riskier than bonds or debentures and some shares are more risky than others. The investor would therefore commit funds on a share only if he is convinced about the rate of return being commensurate with risk.

Concept of Intrinsic Value: A security can be evaluated by the series of dividends or interest payments receivable over a period of time. In other words, a security can be defined as the present value of the future cash streams – the intrinsic value of an asset is equal to the present value of the benefits associated with it. The expected returns (cash inflows) are discounted using the required return commensurate with the risk. Mathematically, it can be represented by:

$$V_0 = C_1/(1 + i)^1 + C_2/(1 + i)^2 + C_3/(1 + i)^3 + C_n/(1 + i)^n$$

$$= C_n/(1 + i)^n$$

Where V_0 = Value of the asset at time zero (t = 0)

P_0 = Present value of the asset

C_n = Expected cash flow at the end of period n

I = Discount rate or required rate of return on the cash flows

N = Expected life of an asset.

Illustration 42. Assuming a discount rate of 10% and the cash flows associated with 2 projects A and B over a 3 year period, determine the value of the assets.

Year	Cash Flows of A (₹)	Cash Flows of B (₹)
1	20,000	10,000
2	20,000	20,000
3	20,000	30,000

Solution: Value of asset A = 20,000 PVIFA(10%, 3y)

= 20,000 × 2.487

= ₹ 49,470

Value of asset B = 10,000 PVIF (10%, 1) + 20,000 PVIF(10%, 2) + 30,000 PVIF (10%, 3)

= 10,000 × 0.909 + 20,000 × 0.826 + 30,000 × 0.751

= 9,090 + 16,520 + 22,530

= ₹ 48,140

Illustration 43. Calculate the value of an asset if the annual cash inflow is ₹ 5,000 per year for the next 6 years and the discount rate is 16%.

Solution:

Value of the asset = $C_n/(1 + i)^n$

= $5,000/(1 + 0.16)^6$

Or = 5,000 PVIFA(16%, 6y)

= 5,000 × 3.685

= ₹ 18,425

Concepts of Value

Book Value is an accounting concept. Value is what an asset is worth today in terms of their potential benefits. Assets are recorded at historical cost and these are depreciated over years. Book value may include intangible assets at acquisition cost minus amortized value. The book value of a debt is stated at the outstanding amount. The difference between the book value of assets and liabilities is equal to the shareholders' net worth. (Net worth is the sum total of paid-up capital and reserves and surplus). Book value of a share is calculated by dividing the net worth by the number of shares outstanding.

Replacement Value is the amount a company is required to spend if it were to replace its existing assets in the present condition. It is difficult to find cost of assets presently used by the company.

Liquidation Value is the amount a company can realize, if it sold the assets after the winding up its business. It will not include the value of intangibles as the operations of the company will cease to exist. Liquidation value is generally the minimum value the company might accept if it sold its business.

Going Concern Value is the amount a company can realize if it sells its business as an operating one. This value is higher than the liquidation value.

Market Value is the current price at which the asset or security is being sold or bought in the market. Market value per share is generally higher than the book value per share for profitable and growing firms.

Valuation of Bonds: Bonds are long term debt instruments issued by government agencies or big corporate houses to raise large sums of money. Bonds issued by government agencies are secured and those issued by private sector companies may be secured or unsecured. The rate of interest on bonds is fixed and they are redeemable after a specific period. Some important terms in bond valuation:

Face Value: Also known as *par value*, this is the value stated on the face of the bond. It represents the amount that the unit borrows which is to be repaid at the time of maturity, after a certain period of time. A bond is generally issued at values such as ₹ 100 or ₹ 1000.

Coupon Rate is the specified rate of interest in the bond. The interest payable at regular intervals is the product of the par value and the coupon rate broken down to the relevant time horizon.

Maturity Period refers to the number of years after which the par value becomes payable to the bond-holder. Generally, corporate bonds have a maturity period of 7-10 years and government bonds 20-25 years.

Redemption Value is the amount the bond-holder gets on maturity. A bond may be redeemed at par, at a premium (bond-holder gets more than the par value of the bond) or at a discount (bond-holder gets less than the par value of the bond).

Market Value is the price at which the bond is traded in the stock exchange. Market price is the price at which the bonds can be bought and sold and this price may be different from par value and redemption value.

Types of Bonds: Bonds are of three types: (a) Irredeemable Bonds (also called perpetual bonds) (b) Redeemable Bonds (i.e., Bonds with finite maturity period) and (c) Zero Coupon Bonds.

Irredeemable Bonds or Perpetual Bonds: Bonds which will never mature are known as irredeemable or perpetual bonds. Indian Companies Act, restricts the issue of such bonds and therefore, these are very rarely issued by corporate these days. In case of these bonds the terminal value or maturity value does not exist because they are not redeemable. The face value is known; the interest received on such bonds is constant and received at regular intervals and hence, the interest receipts resemble a perpetuity. The present value (the intrinsic value) is calculated as:

$$V_0 = I/id$$

If a company offers to pay ₹ 70 as interest on a bond of ₹ 1,000 par value, and the current yield is 8%, the value of the bond is **70/0.08** which is equal to **₹ 875**

Redeemable Bonds: There are two types, viz., bonds with annual interest payments and bonds with semi-annual interest payments.

Bonds with Annual Interest Payments

Basic Bond Valuation Model: The holder of a bond receives a fixed annual interest for a specified number of years and a fixed principal repayment at the time of maturity. The intrinsic value or the present value of bond can be expressed as:

$$V_0 \text{ or } P_0 = \sum^{n}_{t=1} I/(I + k_d)^n + F/(I + k_d)^n$$

Which can also be stated as follows:

$$V_0 = I \times PVIFA(kd, n) + F \times PVIF(kd, n)$$

Where V_0 = Intrinsic value of the bond

P_0 = Present Value of the bond

I = Annual Interest payable on the bond

F = Principal amount (par value) repayable at the maturity time

N = Maturity period of the bond

k_d = Required rate of return

Illustration 44. A bond whose face value is ₹ 100 has a coupon rate of 12% and a maturity of 5 years. The required rate of interest is 10%. What is the value of the bond?

Solution: Interest payable = 100 × 12% = ₹ 12

Principal repayment is ₹ 100

Required rate of return is 10%

V_0 = I × PVIFA(kd, n) + F × PVIF(kd, n)

Value of the bond = 12 × PVIFA(10%, 5y) + 100 × PVIF(10%, 5y)

= 12 × 3.791 + 100 × 0.621

= 45.49 + 62.1

= ₹ 107.59

Illustration 45. Mr. Anant purchases a bond whose face value is ₹ 1,000, maturity period 5 years coupled with a nominal interest rate of 8%. The required rate of return is 10%. What is the price he should be willing to pay now to purchase the bond?

Solution: Interest payable = 1,000 × 8% = ₹ 80

Principal repayment is ₹ 1,000

Required rate of return is 10%

V_0 = I × PVIFA(kd, n) + F × PVIF(kd, n)

Value of the bond = 80 × PVIFA(10%, 5y) + 1,000 × PVIF(10%, 5y)

= 80 × 3.791 + 1,000 × 0.621

= 303.28 + 621

= ₹ 924.28

This implies that the company is offering the bond at ₹ 1,000 but is worth ₹ 924.28 at the required rate of return of 10%. The investor may not be willing to pay more than ₹ 924.28 for the bond today.

Bond Values with Semi-annual Interest Payment: In reality, it is quite common to pay interest on bonds semi-annually. With the effect of compounding, the value of bonds with semi-annual interest is much more than the ones with annual interest payments. Hence, the bond valuation equation can be modified as:

V_0 or P_0 $= \sum^{n}_{t=1} I/2(I + i_0/2)^n + F/(I + i_0/2)^{2n}$

Where, V_0 = Intrinsic value of the bond

P_0 = Present value of the bond

I/2 = Semi-annual interest payable on the bond

F = Principle amount (par value) repayable at the maturity time

2n = Maturity period of the bond expressed in half-yearly periods

$k_o/2$ = Required rate of return semi-annually.

Example: A bond of ₹ 1,000 value carries a coupon rate of 10%, maturity period of 6 years. Interest is payable semi-annually. If the required rate of return is 12%, calculate the value of the bond.

Solution:

V_0 or P_0 $= \sum^{n}_{t=1} (I/2)(I + k_0/2)^n + F/(I + k_0/2)^{2n}$

$= (100/2)/(1 + 0.12/2)4 + 1,000/(1 + 0.12/2)4$

$= 50 \times PVIFA(6\%, 12y) + 1,000 \times PVIF(6\%, 12y)$

$= 50 \times 8.384 + 1,000 \times 0.497$

$= 419.2 + 497$

= ₹ 916.20

It is to be kept in mind that the required rate of return is halved (12%/2) and the period doubled (6y × 2) as the interest is paid semi-annually.

Valuation of Zero Coupon Bonds: In India Zero coupon bonds are alternatively known as Deep Discount Bonds. For close to a decade, these bonds became very popular in India because of issuance of such bonds at regular intervals by IDBI and ICICI. Zero-coupon bonds have no coupon rate, i.e., there is no interest to be paid out. Instead, these bonds are issued at a discount to their face value, and the face value is the amount payable to the holder of the instrument on maturity. The difference between the discounted issue price and face value is effective interest earned by the investor. They are called deep discount bonds because these bonds are long-term bonds whose maturity some time extends up to 25 to 30 years.

Illustration 46. River Valley Authority issued Deep Discount Bond of the face value of ₹ 1,00,000 payable 25 years later, at an issue price of ₹ 14,600. What is the effective interest rate earned by an investor from this bond?

Solution: The bond in question is a zero coupon or deep discount bond. It does not carry any coupon rate. Therefore, the implied interest rate could be computed as follows:

Step 1. Principal invested today is ₹ 14,600 at a rate of interest of "r"% over 25 years to amount to ₹ 1,00,000.

Step 2. It can be stated as $A = P_0 (1 + r)^n$

$$1,00,000 = 14,600\ (1 + r)^{25}$$

Solving for 'r', we get $1,00,000/14600 = (1 + r)^{25}$

$$6.849 = (1 + r)^{25}$$

Reading the compound value (FVIF) table, horizontally along the 25 year line, we find 'r' equals 8%. Therefore, bond gives an effective return of 8% per annum.

Bond-yield Measures

Current Yield: Current yield measures the rate of return earned on a bond if it is purchased at its current market price and the coupon interest received.

Current Yield = Coupon Interest/Current Market Price

Illustration 47. Continuing with the same example above calculate the CY if the current market price is ₹ 920

Solution: CY = Coupon Interest/Current Market Price

= 80/920

= 8.7%

Illustration 48. A bond has a face value of ₹ 1,000 with a 5 year maturity period. Its current market price is ₹ 848.34. It carries an interest rate of 6%. What shall be the rate of return on this bond if it is held till its maturity?

Solution:

V_0 or $P_0 = \sum^{n}_{t=1} (I/2)(I + k_d)^n + F/(I + k_0 d)^n$

OR

$V_0 = I \times PVIFA\ (kd, n) + F \times PVIF(kd, n)$

$= 60 \times PVIFA(Kd, 10) + 1,000 \times PVIF(Kd,10) = 848.34$

We obtain 10% for kd

Illustration 49. A bond has a face value of ₹ 1,000 with a 9 year maturity period. Its current market price is ₹ 850. It carries an interest rate of 8%. What shall be the rate of return on this bond if it is held till its maturity?

Solution:

V_0 or $P_0 = \sum^{n}_{t=1} (I/2)(I + k_d)^n + F/(I + k_0 d)^n$

OR

$V_0 = I \times PVIFA\ (kd, n) + F \times PVIF(kd, n)$

$= 80 \times PVIFA(kd\%, 9) + 1,000 \times PVIF(kd\%, 9) = 850$

To find out the value of kd, **trial an error method** is to be followed. Let us therefore start the value of kd to be 12% and the equation now looks like = 80 × PVIFA(12%, 9) + 1,000 × PVIF(12%, 9) = 850.

Let us now see if LHS equals RHS at this rate of 12%. Looking at the tables we get LHS as 80 × 5.328 + 1,000 × 0.361 = ₹ 787.24.

Since this value is less than the value required on the RHS, we take a lesser discount rate of 10%. At 10%, the equation is = 80 × PVIFA(10%, 9) + 1,000 × PVIF(10%, 9) = 850.

Let us now see if LHS equals RHS at this rate of 11%. Looking at the tables we get LHS as 80 × 5.759 + 1,000 × 0.424 = ₹ 884.72.

We now understand that kd clearly lies between 10% and 12%. We shall interpolate to find out the true value of kd.

10% + {(884.72 – 850)/(884.72 – 787.24)} × (12% – 10%)

10% + (34.72/97.48) × 2

10% + 0.71

Therefore kd = 10.71%

Yield to Maturity (YTM): It is the rate earned by an investor who purchases a bond and holds it till its maturity. The YTM is the discount rate equaling the present values of cash flows to the current market price.

An Approximation: The following formula may be used to get a rough idea about kd as Trial and Error Method is a very tedious procedure and requires lots of time. This formula can be used as a ready reference formula.

YTM = {I + (F – P)/n}/{(F + P)/2}

Where YTM = Yield to Maturity

I = Annual interest payment

F = Face value of the bond

P = Current market price of the bond

N = Number of years to maturity.

Illustration 50. A company issues a bond with a face value of 5,000. It is currently trading at ₹ 4,500. The interest rate offered by the company is 12% and the bond has a maturity period of 8 years. What is YTM?

Solution: YTM = {I + (F – P)/n}/{(F + P)/2}

= 600 + {(5000 – 4500)/8}/{(5000 + 4500)/2}

= {600 + 62.5}/4750

= 13.94%

Bond Value Theorems

The following factors affect the bond values:

- Relationship between the required rate of interest (kd) and the discount rate.
- Number of years to maturity.
- YTM

Relationship between the required rate of interest (kd) and the discount rate:

- When kd is equal to the coupon rate, the intrinsic value of the bond is equal to its face value, that is, if kd = coupon rate, then value of bond = face value.
- When kd is greater than the coupon rate, the intrinsic value of the bond is less than its face value, that is, if kd > coupon rate, then value of bond < face value.
- When kd is lesser than the coupon rate, the intrinsic value of the bond is greater than its face value, that is, if kd < coupon rate, then value of bond > face value.

Illustration 51. Sugam industries wishes to issue bonds with ₹ 100 as par value, coupon rate 12% an YTM 5 years. What is the value of the bond if the required rate of return of an investor is 12%, 14% and 10%.

If kd is 12%, V_0 = I × PVIFA(kd, n) + F × PVIF(kd, n)

= 12 × PVIFA(12%, 5) + 100 × PVIF(12%, 5)

= 12 × 3.605 + 100 × 0.567

= 43.26 + 56.7

= ₹ 99.96 or ₹ 100

If kd is 14%, V_0 = I × PVIFA(kd, n) + F × PVIF(kd, n)

= 12 × PVIFA(14%, 5) + 100 × PVIF(14%, 5)

= 12 × 3.433 + 100 × 0.519

= 41.20 + 51.9

= ₹ 93.1

If kd is 10%, V_0 = I × PVIFA(kd, n) + F × PVIF(kd, n)

= 12 × PVIFA(10%, 5) + 100 × PVIF(10%, 5)

= 12 × 3.791 + 100 × 0.621

= 45.49 + 62.1

= ₹ 107.59

Number of Years to Maturity

- When kd is greater than the coupon rate, the discount on the bond declines as maturity approaches.

- When kd is less than the coupon rate, the premium on the bond declines as maturity approaches.

To show the effect of the above, consider a case of a bond whose face value is ₹ 100 with a coupon rate of 11% and a maturity of 7 years.

If kd is 13%, then, V_0 = I – PVIFA(kd, n) + F × PVIF(kd, n)

= 11 × PVIFA(13%, 7) + 100 × PVIF(13%, 7)

= 11 × 4.423 + 100 × 0.425

= 48.65 + 42.50

= ₹ 91.15

After 1 year, the maturity period is 6 years, the value of the bond is

V_0 = I × PVIFA(kd, n) + F × PVIF(kd, n)

= 11 × PVIFA(13%, 6) + 100 × PVIF(13%, 6)

= 11 × 3.998 + 100 × 0.480

= 43.98 + 48

= ₹ 91.98.

We see that the discount on the bond gradually decreases and value of the bond increases with the passage of time at kd being a higher rate than the coupon rate.

Continuing with the same example above, let us see the effect on the bond value if required rate is 8%.

If kd is 8%, V_0 = I × PVIFA(kd, n) + F × PVIF(kd, n)

= 11 × PVIFA(8%, 7) + 100 × PVIF(8%, 7)

= 11 × 5.206 + 100 × 0.583

= 57.27 + 58.3

= ₹ 115.57

One year later, kd at 8%,

V_0 = I × PVIFA(kd, n) + F × PVIF(kd, n)

= 11 × PVIFA(8%, 6) + 100 × PVIF(8%, 6)

= 11 × 4.623 + 100 × 0.630

= 50.85 + 63

= ₹ 113.85

For a required rate of return of 8%, the bond value decreases with passage of time and premium on bond declines as maturity approaches.

YTM: YTM determining the market value of the bond, the bond price will fluctuate to the changes in market interest rates. A bond's price moves inversely proportional to its YTM.

Valuation of Shares: A company's shares may be categorized as (a) Ordinary or Equity shares and (b) Preference shares. The returns these shareholders get are called dividends. Preference shareholders get a preferential treatment as to the payment of dividend and repayment of capital in the event of winding up. Such holders are eligible for a fixed rate of dividends. Some important features of preference and equity shares.

- **Dividends:** Rate is fixed for preference shareholders. They can be given cumulative rights, that is, the dividend can be paid off after accumulation. The dividend rate is not fixed for equity shareholders. They change with an increase or decrease in profits. During years of big profits, the management may declare a high dividend. The dividends are not cumulative for equity shareholders, that is, they cannot be accumulated and distributed in later years. Dividends are not taxable.
- **Claims:** In the event of the business closing down, the preference shareholders have a prior claim on the assets of the company. Their claims shall be settled first and the balance if any will be paid off to equity shareholders. Equity shareholders are residual claimants to the company' income and assets.
- **Redemption:** Preference shares have a maturity date on which day the company pays off the face value of the share to the holders. Preference shares can be of two types – redeemable and irredeemable. Irredeemable preference shares are perpetual. Equity shareholders have no maturity date.
- **Conversion:** A company can issue convertible preference shares and not vice versa. After a particular period as mentioned in the share certificate, the preference shares can be converted into ordinary shares.

Valuation of Preference Shares: Preference shares, like bonds carry a fixed rate of dividend/return. Symbolically, this can be expressed as:

$$P_0 = Dp/\{1 + Kp)^n\} + P_n/\{(1 + Kp)^n\} \text{ OR}$$

$$P_0 = Dp \times PVIFA(Kp, n) + P_n \times PVIF(Kp, n)$$

Where P_0 = Price of the share

Dp = Dividend on preference share

Kp = Required rate of return on preference share

n = Number of years to maturity

Illustration 52. X Limited has 10% preference shares of ₹ 1,000 each. The required rate of return on preference shares is 9%. the preference shares are redeemable after 8 years. Find out the value of preference shaes.

Solution:

$$P_{0} = 100 \times PVIFAr_{9, 8} + 1{,}000 \times PVIF_{9, 8}$$

$$= 100 \times 5{,}535 + 1{,}000 \times 0.502$$

= 553.5 + 502

= ₹ 1,055.5

Valuation of Ordinary Shares: People hold common stocks for two reasons – to obtain dividends in a timely manner and to get a higher amount when sold. Generally, shares are not held in perpetuity. An investor buys the shares, holds them for some time during which he gets dividends and finally sells it off to get capital gains. The value of a share which an investor is willing to pay is linked with the cash inflows expected and risks associated with these inflows. Intrinsic value of a share is associated with the earnings (past) and profitability (future) of the company, dividends paid and expected and future definite prospects of the company. It is the economic value of a company considering its characteristics, nature of business and investment environment.

Dividend Capitalization Model: When a shareholder buys a share, he is actually buying the stream of future dividends. Therefore the value of an ordinary share is determined by capitalizing the future dividend stream at an appropriate rate of interest. So under the dividend capitalization approach, the value of an equity share is the discounted present value of dividends received plus the present value of the resale price expected when the share is disposed. Two assumptions are made to apply this approach:

- Dividends are paid annually.
- First payment of dividend is made after one year the equity share is bought.

Single Period Valuation Model: This model holds well when an investor holds an equity share for one year. The price of such a share will be:

$$P_0 = \frac{D_1}{(1+Ke)} + \frac{P_1}{(1+Ke)}$$

Where P_0 = Current market price of the share

D_1 = Expected dividend after one year

P_1 = Expected price of the share after one year

Ke = Required rate of return on the equity share

Illustration 53. Gammon India Ltd.'s share is expected to touch ₹ 450 one year from now. The company is expected to declare a dividend of ₹ 25 per share. What is the price at which an investor would be willing to buy if his required rate of return is 15%?

Solution: $P_0 = D_1/(1 + Ke) + P_1/(1 + Ke)$

= {25/(1 + 0.15)} + {450/(1 + 0.15)}

= 21.74 + 391.30

= ₹ 413.04 is the price he is willing to pay today

Multi-period Valuation Model: An equity share can be held or an indefinite period as it has no maturity date, in which case the value of a price at time zero is:

$$P_0 = D_1/(1 + Ke)^1 + D_2/(1 + Ke)^2 + D_3/(1 + Ke)^3 + ... + D_\infty/(1 + Ke)^\infty$$

OR

$$P_0 = \sum^{n}_{t=1} \frac{D_1}{\{(1+Ke)^\infty\}}$$

Where P_0 = Current market price of the share

D_1 = Expected dividend after one year

P_1 = Expected price of the share after one year

D_∞ = Expected dividend at infinite duration

Ke = Required rate of return on the equity share.

The above equation can also be modified to find the value of an equity share for a finite period.

$$P_0 = D_1/(1 + Ke)^1 + D_2/(1 + Ke)^2 + D_3/(1 + Ke)^3 + ... + D_\infty/(1 + Ke)^\infty + P_\infty/(1 + Ke)^\infty$$

$$P_0 = \sum^{n}_{t=1} D_\infty/\{(1 + Ke)^\infty\} + P_\infty/\{(1 + Ke)^\infty\}$$

We can come across three instances of dividends in companies:

- Constant dividends
- Constant growth of dividends
- Changing growth rates of dividends.

Valuation with Constant Dividends: If constant dividends are paid year

After year, then $P_o = D_1/(1 + Ke)^1 + D_2/(1 + Ke)^2 + D_3/(1 + Ke)^3 + ... + D_\infty/(1 + Ke)^\infty$

Simplifying this we get P = D/Ke

Valuation with Constant Growth in Dividends: Here we assume that dividends tend to increase with time as and when businesses grow over time. If the increase in dividend is at a constant compound rate, then $P_0 = D_1/Ke\text{-}g$, where g stands for growth rate.

Illustration 54. Sagar automobiles Ltd.'s share is traded at ₹ 180. The company is expected to grow at 8% per annum and the dividend expected to be paid off is ₹ 8. If the rate of return is expected to be 12%, what is the price of the share one would be expected to pay today?

Solution: $P_0 = D_1/Ke - g$

$= 8/0.12 - 0.08$

$=$ ₹ 200

Illustration 55. Monica labs is expected to pay ₹ 4 as dividend per share next year. The dividends are expected to grow perpetually@8%. Calculate the share price today if the market capitalization is 12%.

Solution: $P_0 = D_1/Ke - g$

$P_0 = 4/(0.12 - 0.08)$

= ₹ 100

Valuation with Variable Growth in Dividends: Some firms may not have a constant growth rate of dividends indefinitely. There are periods during which the dividends may grow supernormally, that is, the growth rate is very high when the demand for the company's products is very high. After a certain period of time, the growth rate may fall to normal levels when the returns fall due to fall in demand for products (with competition setting in or due to availability of substitutes). The price of the equity share of such a firm is determined in the following manner:

Step 1. Expected dividend flows during periods of supernormal growth is to be considered and present value of this is to be computed with the following equation:

$$P_0 = \sum^{n}_{t=1} D_n/(1 + Ke)^n$$

Value of the share at the end of the initial growth period is calculated as:

$P_n = (D_{n+1})/(Ke - gn)$ (constant growth model). This is discounted to the present value and we get:

$(D_{n+1})/(Ke - gn) \times 1/(1 + Ke)^n$

Add both the present value composites to find the value P0 of the share, that is, $P_0 = \sum^{\infty}_{t=1} D_n/(1 + Ke)^n + (D_{n+1})/(Ke - gn) \times 1/(1 + Ke)^n$

Illustration 56. Souparnika Pharma's current dividend is ₹ 5. It expects to have a supernormal growth period running to 5 years during which the growth rate would be 25%. The company expects normal growth rate of 8% after the period of supernormal growth period. The investors' required rate of return is 15%. Calculate what the value of one share of this company is worth.

Solution: D_0 = 5, n = 5y, ga (supernormal growth) = 25%, gn (normal growth) = 8%, Ke = 14%

Step I: $P_0 = \sum^{\infty}_{t=1} D_n/(1 + Ke)^n$

$D1 = 5\ (1.25)^1$

$D2 = 5\ (1.25)^2$

$D3 = 5\ (1.25)^3$

$D4 = 5\ (1.25)^4$

$D5 = 5\ (1.25)^5$

The present value of this flow of dividends will be:

$5(1.25)/(1.15) + 5(1.25)^2/(1.15)^2 + 5(1.25)^3/(1.15)^3 + 5(1.25)^4/(1.15)^4 + 5(1.25)^5/(1.15)^5$

$5.43 + 5.92 + 6.42 + 6.98 + 7.63 = 32.38$

Step II: $P_n = (D_{n+1})/(Ke - g)$

$P5 = D6/Ke - gn$

$= D5(1 + gn)/Ke - gn$

$= \{5(1.25)^5 (1 + 0.08)\}/(0.15 - 0.08)$

$= 15.26(1.08)/0.07$

$= 16.48/0.07$

$= 235.42$

The discounted value of this price is $235.42/(1.15)^5 = ₹ 117.12$

Step III: $P_0 = \sum^{\infty}_{t=1} D_n/(1 + Ke)^n + (D_{n+1})/(Ke - gn) \times 1/(1 + Ke)^n$

The value of the share is ₹ 32.38 + ₹ 117.12 = ₹ 149.50

Other Approaches to Equity Valuation

In addition to the dividend valuation approaches discussed in the previous section, there are other approaches to valuation of shares based on **"Ratio Approach".**

Book Value Approach: The book value per share (BVPS) is the *net worth of the company divided by the number of outstanding equity shares*. Net worth is represented by the sum total of paid up equity shares, reserves and surplus. Alternatively, this can also be calculated as the *amount per share on the sale of the assets of the company at their exact book value minus all liabilities including preference shares.*

Illustration 57. A One Ltd. has total assets worth ₹ 500 cr., liabilities worth ₹ 300 cr., and preference shares worth ₹ 50 cr. and equity shares numbering 10 lakhs

Solution: The BVPS is ₹ 150 cr./10 lakhs = ₹ 150

BVPS does not give a true investment picture. This relies on historical book values than the company's earning potential.

Liquidation Value: The liquidation value per share is calculated as:

{(Value realized by liquidating all assets) – (Amount to be paid to all Crs. and Pre SH)} divided by Number of outstanding shares.

In the above example, if the assets can be liquidated at ₹ 450 Cr., the liquidation value per share is (450Cr – 350Cr)/10 lakh shares which is equal to ₹ 1,000 per share.

Price Earnings Ratio: The price earnings ratio reflects the amount investors are willing to pay for each rupee of earnings.

Expected Earnings per Share = (Expected PAT) – (Preference dividend)/Number of Outstanding Shares. Expected PAT is dependent on a number of factors like sales, gross profit margin, depreciation and interest and tax rate. The P/E ratio is also to consider factors like growth rate, stability of earnings, company size, company management team and dividend pay-out ratio.

P/E ratio = (1 – b)/r – (ROE × b)

Where 1-b is dividend pay out ratio

r is required rate of return

ROE × b is expected growth rate.

Illustration 58. The current price of a Ashok Leyland share is ₹ 30. The company is expected to pay a dividend of ₹ 2.50 per share which goes up annually at 6%. If an investor's required rate of return is 11%, should he buy this share or not? Advise.

Solution: $P = D_1(1 + g)/Ke – g = 2.5(1 + 0.06)/0.11 – 0.06 =$ ₹ 53. The investor should certainly buy this share at the current price of ₹ 30 as the valuation model says the share is worth ₹ 53.

Illustration 59. A bond with a face value of ₹ 100 provides an annual return of 8% and pays ₹ 125 at the time of maturity, which is 10 years from now. If the investor's required rate of return is 12%, what should be the price of the bond?

Solution: P = Int. × PVIFA(12%, 10y) + Redemption price × PVIF(12%, 10y)

= 8 × PVIFA(12%, 10y) + 125 × PVIF(12%, 10y)

= 8 × 5.65 + 125 × 0.322

= 45.2 + 40.25

= ₹ 85.45

The price of the bond should be ₹ 85.45.

Illustration 60. The bond of Silicon Enterprises with a par value of ₹ 500 is currently traded at ₹ 435. The coupon rate is 12% with a maturity period of 7 years. What will be the yield to maturity?

Solution: r = I + {(F – P)/n}/(F + P)/2

= 60 + {(500 – 435)/7}/(500 + 435)/2

= **15.03%**

Illustration 61. The share of Megha Ltd is sold at ₹ 500 a share. The dividend likely to be declared by the company is ₹ 25 per share after one year and the price one year hence is expected to be ₹ 550. What is the return at the end of the year on the basis of likely dividend and price per share?

Solution: Holding period return = (D1 + Price gain/loss)/purchase price

= (25 + 50)/500 = **15%**

Illustration 62. A bond of face value of ₹ 1000 and a maturity of 3 years pays 15% interest annually. What is the market price of the bond if YTM is also 15%?

Solution: P = Int. × PVIFA(15%, 3y) + Redemption value × PVIF(15%, 3y)

P = 150 × 2.283 + 1000 × 0.658

P = 342.45 + 658 = ₹ 1,000.45

Illustration 63. A perpetual share pays an annual dividend of ₹ 15 on a face value of ₹ 100 and the rate of return required by investors on such investments is 20%. What should be the market price of the preference share?

Solution: Expected yield = Expected income/current market price

Expected yield = 15/0.2 = ₹ 75

Illustration 64. XYZ Limited has issued a paid up capital of 5 lakh shares of ₹ 10 each. The company declares a dividend of ₹ 12.5 lakhs during the last 5 years and expects to maintain the same level of dividend in the future. The average dividend yield for same line of business is 18%. Calculate the value of 3000 shares of the company.

Solution:

Step 1:

Calculate dividend/share.

$$= \frac{\text{Total Dividend declared}}{\text{No. of Equity Shares}}$$

$$= \frac{12,50,000}{5,00,000}$$

$$= 2.5$$

Step 2:

Find out Value/Share.

$$= \frac{\text{Dividend / Share}}{\text{Average Dividend Yield}}$$

$$= \frac{2.5}{0.18}$$

$$= ₹\ 13.888$$

Step 3:

Value of 3,000 shares = 3,000 × 13.888

= ₹ 41,664

Fair Value Method

Fair value of a share is the average value of a share determined on the basis of book value or market value or liquidation and dividend yield value.

$$\text{Fair Value} = \frac{\text{Book Value / Market Value / Liquidation Value + Dividend Yield Value}}{2}$$

Illustration 65. The Balance Sheet of XYZ Limited as at 31st March, 2009 is given below:

Liabilities	₹	Assets	₹
Equity Share Capital		Land	14,00,000
(5,00,000 shares @ ₹ 10 each)	50,00,000	Buildings	23,00,000
General Reserve	15,00,000	Plant and Machinery	28,00,000
Debentures (14%)	10,00,000	Sundry Debtors	6,00,000
Sundry Creditors	5,00,000	Inventory	8,00,000
Bank Overdrafts	4,00,000	Cash and Bank	2,00,000
Provision for Taxation	1 ,00,000	Patents and Trade Marks	3,00,000
		Preliminary Expenses	1,00,000
	85,00,000		85,00,000

The profits of the company for the past four years are as follows:

	₹
2006	12,00,000
2007	15,00,000
2008	21,00,000
2009	23,00,000

Every year, the company transfers 20% of its profits to the general reserve. The industry average rate of return is 18% of the share value.

On 31st March, 2009; Independent expert valuer has assessed the values of the following assets:

	₹
Land	26,00,000
Buildings	40,00,000
Plant and Machinery	32,00,000
Debtors (after Bad Debts)	5,00,000
Patents and Trademarks	2,00,000

Based on the information given above, calculate the fair value of XYZ Limited's share.

Solution:

Step 1:

Market Value of a Share:

Assets at Market Value:		
Land	₹	26,00,000
Buildings	₹	40,00,000
Plant & Machinery	₹	32,00,000
Debtors	₹	5,00,000
Patents and Trademarks	₹	2,00,000
Inventory	₹	8,00,000
Cash and Bank	₹	2,00,000
	A ₹	1,15,00,000
Less: External Liabilities		
Debentures	₹	10,00,000
Creditors	₹	5,00,000
Bank Overdrafts	₹	4,00,000
Provision for Taxation	₹	1,00,000
	B ₹	20,00,000

Market Value of Assets available to Equity Shareholders (A – B) ₹ 95,00,000

Step 2:

$$\text{Market value of a share} = \frac{\text{Market value of assets available to Equity Shareholders}}{\text{No. of Equity Shares}}$$

$$= \frac{95,00,000}{5,00,000}$$

$$= ₹\ 19$$

Dividend Yield Method

$$\text{Dividend per share} = \frac{\text{Total dividend declared}}{\text{No. of shares}}$$

Calculation of profit available for dividend (231 – 12 Bad debts in revised debtors)

$$\text{Average Profit} = \frac{12,00,000 + 15,00,000 + 21,00,000 + 22,00,000}{4}$$

$$= ₹\ 17,50,000$$

Less: Transfer in General Reserve 20%	=	₹ 3,50,000
Profit available for dividend		₹ 14,00,000

$$\text{Rate of Dividend} = \frac{\text{Profit available for Dividend}}{\text{Paid-up capital}} \times 100$$

$$= \frac{14,00,000}{50,00,000} \times 100$$

$$= 28\%$$

So dividend/share = 28% of 10

= ₹ 2.8

Step 3:

$$\text{Value/Share} = \frac{\text{Dividend / Share}}{\text{Average dividend yield}}$$

$$= \frac{2.8}{0.18}$$

Dividend Yield Value = ₹ 15.55.

$$\text{Fair value of the firm} = \frac{\text{Market Value of a Share + Dividend Yield Value}}{2}$$

$$= \frac{19 + 15.55}{2}$$

= ₹ 17.28

Average performance in the past is the indicator of future performance. In this problem the company has not declared any specific dividend. The profit that would be available for the purpose of dividend is calculated on average basis, 'because dividend rate is worked out at an average rate (i.e., uniform). For valuation purpose, we always consider an average profit and not single years profit.

Illustration 66. The Balance Sheet of Ganesh Limited as on 31st March, 2009 was as under:

Liabilities	₹	Assets	₹
2,000 Equity Shares of ₹ 100 each	2,00,000	Land and Building	1,25,000
General reserve	50,000	Machinery	75,000
Profit & Loss Account	25,000	Investments at Cost	
Creditors	45,000	(Market value ₹ 37,500)	45,000
Provision for Taxation	20,000	Debtors	50,000
Provident Fund	17,500	Stock	27,500
	3,57,500		3,57,500

Additional Information:

1. Land & Building & Machinery are valued at ₹ 1,37,500 & ₹ 55,000 respectively.
2. Of the total Debtors, ₹ 2,500 are bad.
3. Goodwill is to be taken at ₹ 25,000.
4. The normal rate of dividend, declared by such type of companies is 15% on the paid-up capital.
5. The average rate of dividend, declared and paid by this company is 18% on its paid up capital.

   Calculate the fair value of the equity share of the company.

Solution:

1. Calculation of Net Tangible Assets (At Realisable Value):

	₹	₹
Goodwill	25,000	
Land and Buildings	1,37,500	
Machinery	55,000	
Investments	37,500	
Debtors	47,500	
Stock	37,500	
Cash at Bank	25,000	3,65,000
Less: Liabilities:		
Creditors	45,000	
Provision for Taxation	20,000	
Provision for Taxation	17,500	82,500
Net Tangible Assets		2,82,500

$$\text{Value of Shares} = \frac{\text{Net Tangible Assets}}{\text{Number of Equity Shares}}$$

$$= \frac{₹\,2,82,500}{2,000}$$

$$= ₹\,141.25$$

2. Value of Shares — Yield Basis:

$$= \frac{\text{Average rate of dividend}}{\text{Normal rate of dividend}} \times \text{Paid up value of shares}$$

$$= \frac{18\%}{15\%} \times 100$$

$$= ₹\ 120$$

Illustration 67. Following was the Balance Sheet of Metal India Pvt. Ltd. as on 31st December 2008. You are required to work out the fair value of its shares.

Liabilities	₹	Assets	₹
2,0008% Preference Shares		Building at Cost	1,80,000
of ₹ 100 each fully paid up	2,00,000	Furniture	25,000
3,000 Equity Shares of ₹ 100 each		Stock at Market Value	3,95,000
fully paid up	3,00,000	Sundry Debtors	3,15,000
Reserve Fund	1,00,000	6% Govt. securities at cost	2,45,000
Profit & Loss *AI* c:		Bank and Cash	50,000
Balance		Preliminary Expenses	10,000
on 1.1.2008 1,00,000			
Profit for 2008 3,20,000	4,20,000		
Accident Insurance			
Fund	80,000		
Depreciation Provisions against:			
Building 25,000			
Investments 40,000	65,000		
Creditors	5,000		
	12,20,000		12,20,000

The company's business prospects for 2008 are equally good. The buildings and investments are worth ₹ 4,00,000 and ₹ 2,10,000 respectively.

12% is the normal rate of dividend declared by similar business after payment of income tax of 50% of profits and transfer to general reserve of 20% of balance profits. Profits for the last 3 years have shown an upward trend of ₹ 40,000 annually.

Solution:

1. Calculation of Average Profits:

Profit for 2008	₹ 3,20,000
Profit for 2007	₹ 2,80,000
Profit for 2006	₹ 240,000
	₹ 8,40,000

Average Profits = $\frac{8,40,000}{3}$ = ₹ 2,80,000

2. Calculation of Net Tangible Assets:

	₹	₹
Buildings	4,00,000	
Furniture	25,000	
Stock	3,95,000	
Sundry Debtors	3,15,000	
Investments (6% Government Securities)	2,10,000	
Bank and Cash	50,000	13,95,000
Less: Creditors		55,000
		13,40,000
Less: Preference Share Capital		2,00,000
Net Worth		11,40,000

3. Normal Profit:

12% on the Net Tangible Assets = ₹ 1,36,800

4. Super Profits:

	₹
Average Profits [as per (I) above]	2,80,000
Normal Profits [as per (3) above]	1,36,800
Super Profits	1,43,200

5. Goodwill:

Say 3 years Super Profits ₹ 4,29,600.

6. Total Assets belonging to Equity Shareholders:

	₹
Net Tangible Assets	11,40,000
Goodwill	4,29,600
	15,69,600

7. Valuation of Shares:

(a) On the basis of total assets : $\frac{₹\,15,69,600}{3,000}$ = ₹ 523.20

(b) On the yield basis : $\frac{₹\,2,80,000}{3,000} \times \frac{100}{12}$ = ₹ 777.78

Notes:

1. In want of sufficient information, accident insurance fund has not been treated as liability .
2. It is assumed that transfer of 20% of profits to general reserve is the trend followed by the industry as a whole. It is further assumed that the same trend will be followed by Metal India Pvt. Ltd. also. As such, the profits available to the equity shareholders will be only after payment of income tax @ 50% and transfer to general reserve @ 20%.

Illustration 68. The upward trend of profits of ₹ 40,000 is assumed to be with respect to the profits after tax and after the transfer to general reserve. On 31st March, 2009; Balance Sheet of Menon Ltd. was as follows:

(₹ in lakhs)

Liabilities	₹	Assets	₹
Share Capital:		Land and Buildings	2.20
Authorised & Issued:		Plant and Machinery	0.95
5,000 Equity Shares of		Stock	3.50
₹ 100 each fully paid up	5.00	Sundry Debtors	1.55
Profit & Loss Account	1.03		
Bank Overdraft	0.20		
Creditors	0.77		
Provision for Taxation	0.45		
Proposed Dividend	0.75		
	8.20		8.20

The net profits of the company after deducting all working charges and providing for depreciation and taxation were as under:

Year ended 31st March, 2005 ₹ 0.85

Year ended 31st March, 2006 ₹ 0.96

Year ended 31st March, 2007 ₹ 0.90

Year ended 31st March, 2008 ₹ 1.00

Year ended 31st March, 2009 ₹ 0.95

On 31 st March, 2009; Land & Building were valued at ₹ 2,50,000 and Plant & Machinery at ₹ 1,50,000. In view of the nature of business, it is considered that 10% is a reasonable return on tangible capital.

Prepare a valuation of the company's shares after taking into account the revised values of fixed assets and your own valuation of goodwill based on 5 years' purchase of the super profits based on the average profits for the last 5 years.

Solution:

1. Calculation of Average Profits:

31.3.2005	₹ 85,000
31.3.2006	₹ 96,000
31.3.2007	₹ 90,000
31.3.2008	₹ 1,00,000
31.3.2009	₹ 95,000
	₹ 4,66,000

$$\text{Average Profits} = \frac{4,66,000}{5} = ₹\ 93,200$$

2. **Calculation of Capital Employed:**

Land & Building		₹ 2,50,000	
Plant & Machinery		₹ 1,50,000	
Stock		₹ 3,50,000	
Sundry Debtors		₹ 1,55,000	₹ 9,05,000
Less:	Bank Overdraft	₹ 20,000	
	Creditors	₹ 77,000	
	Provision for Taxation	₹ 45,000	
	Proposed Dividend	₹ 75,000	₹ 2,17,000
	Capital Employed		₹ 6,88,000

3. **Normal Profit:**

10% of Capital Employed i.e. ₹ 68,800.

4. **Super Profits:**

Average Profits [as per (I) above]	₹ 93,200
Normal Profits [as per (3) above]	₹ 68,800
∴ Super Profits	₹ 24.400

5. **Goodwill**:

Equivalent to 5 years' Super Profits ₹ 1,22,000.

Hence, valuation of shares of M/s Menon Ltd. will be as below:

Capital Employed (Tangible)	₹ 6,88,000
Goodwill	₹ 1.22,000
∴ Total Value	₹ 8,10,000

∴ Value per share = ₹ 162.

Illustration 69. Nandita Limited has issued a 10% coupon interest rate, 10 year bond with a ₹ 1,000 par value. The company pays interest annually.

B = [₹ 100 × ($PVIFA_{10,10}$) + ₹ 1,000 ($PVIF_{10,10}$)]

= (₹ 100 × 6.145) + (₹ 1,000 × .386)

= 614.5 + 386

= ₹ 1,000

The value of a bond is equal to par value. When the required return is equal to the coupon rate, the bond value is equal to the par value.

Impact of Required Return on Bond Values

Whenever, the required return on Bond differs from its coupon rate, the value of a Bond would be different from its par value. The required rate of return may differ from the coupon rate due to change in the basic cost of long-term funds or change in the basic risk of the firm.

If the required rate of return is more than the coupon rate of interest the bond value will be less than the par value. It means the bond will sell at a discount. If the required rate of return is less than the coupon rate of interest the bond value will be more than the par value. In such a case, the bond will sell at a premium.

Illustration 70. Consider the above example. If the required rate of return is 12% and 8%, find out the value of the bond.

Solution:

1. If the required rate of return is 12%:

B = [₹ 100 × ($PVIFA_{12,l0}$) + ₹ 1000 × ($PVIF_{12,10}$))

= ₹ 100 × 5.650 + ₹ 1,000 × 0.322

= 565 + 322

= ₹ 887

The bond will be sold at a discount of ₹ 113 (1,000 – 887)

If the required rate of return is 8%

B = [₹ 100 × ($PVIF_{Ag,10}$) + ₹ 1,000 × ($PVIF_{8,10}$)

= ₹ 100 × 6.710 + ₹ 1,000 × 0.463

= 671 + 463

= 1,134

The bond will be sold at a premium of ₹ 134 (1,134 - 1,000).

Impact of Maturity on Bond Value

If the required return is different from the coupon rate of interest the maturity time would affect the value of bonds even though the Required Return remains constant till maturity.

Bond Values and Required Returns

Required Return	Bond Value (₹)	Status
12%	887	At Discount
10%	1,000	At par
8%	1,134	At premium

Illustration 71. The bonds of TCS Limited are currently selling for ₹ 10,800. Compare YTM when coupon rate of interest, 10% par value ₹ 1,000, maturity payment.

Solution: ₹ 10,800 [₹ 1,000 × $PVIFAK_{d,10}$) + ₹ 10,000 × ($PVIFAK_{d,10}$)]

If the required rate of return is 10%, the value of bond would be ₹ 10,000. Since the value of bond is ₹ 10,800, the required return must be less than 10%. Hence 9% rate is taken to find out the value.

= ₹ 1,000 × ($PVIFA_{9,10}$) + ₹ 10,000 × ($PVIF_{9,10}$)

= (1,000 × 6.418) + (10,000 × .422)

= 6418 + 4220

= ₹ 10,638.

Since the value of Bonds ₹ 10,638 at 9% is less than ₹ 10,800, lower rate of discount is tried.

At 8%, the value will be:

= (1,000 × 6.710) + (10,000 × .463)

= = 6,710 + 4,630

= ₹ 11,340.

This value is higher than the current price of ₹ 10,800. The YTM must be between 8% and 9%.

The exact value *is* found by interpolation.

1. Difference between bond values = ₹ 702 (11,340 – 10,638).
2. Difference between desired value = ₹ 540 (11 ,340 – 10,800).
3. % of difference = $\frac{540}{720}$ = 077.
4. Multiply the per cent by 1 = 0.77 × 1% = 0.77.
5. Add the value to the interest rate

   YTM = 8 + .77

   YTM = 8.77%

Bond Value when interest is paid half yearly:

In this case following steps should be taken:

1. Divide annual interest 1 by 2 to get semi-annual interest.
2. Find out the number of 6 months periods to maturity by multiplying n, by 2.
3. Convert the required return for similar risks bonds that pay half yearly interest from the annual rate, kd, to a semi-annual rate by dividing it by 2. Following equation is applicable:

$$B = \frac{1}{2} \times (PVIFAK_{d/2.\ 2/n}), + M \times (PVIFK_{d/2,\ 2^{n}})$$

Illustration 69. Ganga Limited is presently selling the bonds for ₹ 10,800. Coupon rate of interest is 10%, Face value Rs, 10,000, 10 years to maturity. Interest is paid half yearly, The stated rate of return is 18% compute the value of the bond.

Solution:

$B = (1{,}000 + 2) \times (PVIFA_{18/2 \times 2,10}) + (10{,}000 \times PVIF_{18/2,2 \times 10})$

$B = [(1{,}00012) \times (PVIFA_{9,\ 20}) + 10{,}000 \times (PVIF_{9,20})]$

$= 500 \times (9.129) + 10{,}000\ (0.178)$

$= 4{,}564.5 + 1{,}780$

$= ₹\ 6{,}344.5$

Illustration 72. Suppose an investor is considering the purchase of a five year, ₹ 1,000 par value bond, bearing a nominal (coupon) rate of interest of 7%. The investor's required rate of return is 8%. What should he be willing to pay now to purchase the bond if it matures at par?

The investor will receive cash ₹ 70 as interest each year for 5 years and ₹ 1,000 on maturity (i.e. at the end of the fifth year).

The PV can be worked out as given below:

Solution:

Year	Interest ₹	Discount Factor 8%	PV ₹
1	70	0.926	64.82
2	70	0.857	59.99
3	70	0.794	55.58
4	70	0.735	51.45
5	1070	0.681	728.67
			960.51

Illustration 73. The Government is proposing to sell a 5 years bond of ₹ 1,000 at 8% rate of interest per annum. The bond amount will be amortised equally over its life. If an investor has a minimum required rate of return of 7%, what is the bond's present value for him?

Solution: The period of the bond is 5 years and the rate of interest is 8%. It is mentioned that amount of bond will be amortised equally over 5 years. The amount to be amortised every year will be $\frac{1,000}{5}$ = ₹ 200. Interest will be charged on outstanding amount.

Calculation of Interest:

1st year	=	1,000	8% of 1,000	=	80
Repayment at the end of 1st year		200			
Outstanding	=	800	8% of 800	=	64
Repayment at the end of 2nd year	=	200			
Outstanding	=	600	8% of 600	=	48
Repayment at .the end of 3M year	=	200			
Outstanding	=	400	8% of 400	=	32
Repayment at the end of 4th year	=	200			
Outstanding	=	200	8% of 200	=	16

Every year the outflow will be 200 + Interest.

			Outflow ₹	Discount 7% factor	PV ₹
1st year	200 + 80	=	280	0.935	261.8
2nd year	200 + 64	=	264	0.873	230.47
3rd year	200 + 48	=	248	0.816	202.368
4th year	200 + 32	=	232	0.763	177.016
5th year	200 + 16	=	216	0.713	154.008
					1025.662

Perpetual Bonds

Perpetual Bonds are those bonds which' do not mature. Such bonds are rarely found in practice. As these bonds do not mature, the value of the bonds would be discounted value of the interest.

Illustration 74. Taking into account the above example every year the interest is ₹ 70. If the current yield is 8%, what will be the value of the bond?

Solution:

$$\text{Bond Value} = \frac{\text{Interest}}{\text{Current yield}}$$

$$= \frac{70}{8\%}$$

$$= ₹\ 875$$

Illustration 75. If the current yield in the above example No. 20 'is 7%.

Find ,out the value of the bond.

Solution:

$$\text{Interest} = ₹\ 70$$

$$= \frac{\text{Interest}}{\text{Current yield}}$$

$$= \frac{70}{7\%}$$

$$= ₹\ 1{,}000$$

Yield to Maturity

The yield to maturity of a bond is the interest rate at which the present value of the cash flow receivable equals to the price of the bond.

In other words it is the Internal Rate of Return. Mathematically following equation can be applied to decide yield to maturity.

$$P = \frac{C}{(1+r)} + \frac{C}{(1+r)^2} + \ldots\ldots\ldots + \frac{C}{(1+r)^n} + \frac{M}{(C+r)^n}$$

P = Price of the bond

C = Annual interest

M = Maturity value

n = Number of years left to maturity

Illustration 76.

1. . A ₹ 100 perpetual bond is currently selling for ₹ 95. The coupon rate of interest is 13.5% and the appropriate discount rate is 15%. Calculate the value of the bond. Should it be bought? What is its yield to maturity?
2. A company proposes to sell ten year debentures of ₹ 10,000 each. The company would repay ₹ 1,000 at the end of every year and will pay interest annually at 15% on the outstanding amount.

   Determine the present value of the debenture issue if the capitalisation rate is 16% .

Solution:

1. Value of the bond $= \frac{\text{Interest}}{\text{Current yield}}$

$$= \frac{₹\,13.5}{15\%}$$

$$= ₹\,90$$

Value of the bond should be = ₹ 90.

But it is selling at ₹ 95. The bond is over valued. Therefore, it should not be purchased.

Yield to Maturity $= \frac{\text{Interest}}{\text{Current value of bond}}$

$$= \frac{13.5}{9.5} \times 100$$

$$= 14.2\%$$

2. The value of debentures is ₹ 10,000. The company would repay Rs, 1,000 at the end of every year. Therefore, the outflow will be interest plus ₹ 1,000.

Year		Interest ₹	Outflow Factor	Discount 16%	PV ₹
1	10,000	1,500	1000 + 1500 = 2500	0.862	2155
Repayment	1,000				
Outstanding	9,000	1,350	1000 + 1350 = 2350	0.743	1746
2	1,000				
Outstanding	8,000	1,200	1000 + 1200 = 2200	0.641	1410.2
3	1,000				
Outstanding	7,000	1,050	1000 + 1050 = 2050	0.552	1131.6
4	1,000				
Outstanding	6,000	900	1000 + 900 = 1900	0.476	904.4
5	1,000				
Outstanding	5,000	750	1000 + 750 = 1750	0.410	717.5
6	1,000				
Outstanding	4,000	600	1000 + 600 = 1600	0.354	566.4
7	1,000				
Outstanding	3,000	450	1000 + 450 = 1450	0.305	442.25
8	1,000				
Outstanding	2,000	300	1000 + 300 = 1300	0.263	341.9
9	1,000				
Outstanding	1,000	150	1000 + 150 = 1150	0.227	261.05
					9676.3

EXERCISE

Self-assessment Questions 1

1. The important factors contributing to time value of money are _____, _____ and _____.
2. During periods of inflation, a rupee has a _____ than a rupee in future.
3. As future is characterized by uncertainty, individuals prefer _____ consumption to _____ consumption.
4. There are two methods by which time value of money can be calculated by _____ and _____ techniques.

Self-assessment Questions 2

1. _____ is created out of fixed payments each period to accumulate to a future sum after a specified period.
2. The _____ of a future cash flow is the amount of the current cash that is equivalent to the investor.
3. An annuity for an infinite time period is called _____.
4. The reciprocal of the present value annuity factor is called _____.

Self-assessment Questions 3

1. _____ is the minimum value the company accepts if it sold its business.
2. _____ per share is generally higher than the book value per share for profitable and growing firms.
3. Bonds issued by _____ are secured and those issued by private sector companies may be _____ or _____.
4. _____ is the rate earned by an investor who purchases a bond and holds it till its maturity.
5. When Kd is lesser than the coupon rate, the value of the bond is _____ than its face value.
6. _____ of a share is associated with the earnings (past) and profitability (future) of the company, dividends paid and expected and future definite prospects of the company.
7. The _____ is the net worth of the company divided by the number of outstanding equity shares.

Answers to SAQs

Self-assessment Questions 1

1. Investment opportunities, preference for consumption, risk.
2. Higher purchasing power

3. Current and future
4. Compounding and discounting

Self-assessment Questions 2

1. Sinking fund
2. Present Value PV
3. Perpetuity
4. Capital Recovery Factor.

Self-assessment Questions 3

1. Liquidation value
2. Market value
3. Government agencies, secured or unsecured
4. Yield to Maturity
5. Greater
6. Intrinsic value
7. Book value per share (BVPS)

Self-assessment Questions 4

(a) When compounding is done more than annually, the effective rate of interest is _____.

(i) Greater than the nominal rate of interest
(ii) Lower than nominal rate of interest
(iii) Equal to nominal rate of interest

(**Ans.** i)

(b) Which provides money with its time value?

(i) Investment
(ii) Interest rate
(iii) Market rates
(iv) Currency rates

(**Ans.** ii)

(c) When payments are made at the end of each year, it is known as _____ annuity.

(i) Annuity due
(ii) Ordinary annuity

(iii) Perpetuity
(iv) Fixed annuity

(**Ans.** ii)

Self-assessment Questions 5

I. State with reasons whether the following statements are True or False.

1. The value of a bond is the present value of future interest flow discounted at appropriate discount rate.
2. Bonds do not have a maturity date.
3. An equity share has a face value.
4. Valuation of securities should be made within the risk and return criterion.
5. Valuation of securities is an application of value of money.
6. Goodwill forms a part of liquidation value.
7. The value of a share is equal to the present value of its expected future dividend.
8. Book value represents current sale value.
9. Market value can be applied to tangible assets only.

[**Ans:** True: (1, 3, 4, 5, 7, 9). False: (2, 6, 8)]

Self-assessment Questions 6

II. Match the following.

Group A	Group B
1. Preference Shares	(i) P.V. of future expected dividend
2. Value of Equity Shares	(ii) dividend is expected to grow at a constant rate
3. Constant Growth Model	(iii) value as per Balance Sheet
4. Book Value.	(iv) tangible assets
5. Market Value	(v) amount expected to be received on liquidation
6. Liquidation Value	(vi) average of two values
	(vii) fixed rate of dividend

[**Ans:** (1-vii), (2-i), (3-ii), (4-iii), (5-iv), (6-v)]

Self-asessment Questions 7

1. Value of a share depends on
   (i) dividend only.
   (ii) earning only.
   (iii) both dividend and earnings.
2. Yield to maturity is a bond's
   (i) IRR.
   (ii) coupon rate.
   (iii) market value.
3. Zero Growth Model assumes that
   (i) there will be growing dividend stream.
   (ii) there will be non-growing constant dividend stream.
   (iii) none of the above.
4. Constant Growth Model is known as
   (i) Zero Growth Model.
   (ii) Variable Growth Model.
   (iii) Gordon Model.
5. The model incorporates change in the dividend growth rate
   (i) Gordon Model.
   (ii) Variable Growth Mod';
   (iii) Constant Growth Model.
6. Book value of an asset does not represent
   (i) liquidation value.
   (ii) current sale value.
   (iii) none of the above.
7. Market value can be applied to
   (i) tangible assets only.
   (ii) intangible assets only.
   (iii) both of the above.
8. Average of the two values is
   (i) fair value.
   (ii) market value,
   (iii) book value.

9. Bonds which do not mature
   (i) perpetual bonds.
   (ii) zero coupon bonds,
   (iii) none of the above.

   [**Ans.** (1- iii), (2 - i), (3 - ii), (4 - iii), (5 - ii), (6 - ii), (7 - i), (8 - i), (9 - i)]

Terminal Questions 1

1. If you deposit ₹ 10,000 today in a bank that offers 8% interest, in how many years will this amount double?
2. An employee of a bank deposits ₹ 30,000 into his PF A/c at the end of each year for 20 years. What is the amount he will accumulate in his PF at the end of 20 years, if the rate of interest given by PF authorities is 9%?
3. A person can save _____ annually to accumulate ₹ 4,00,000 by the end of 10 years, if the saving earns 12%.
4. Mr. Vinod has to receive ₹ 20,000 per year for 5 years. Calculate the present value of the annuity assuming he can earn interest on his investment at 10% p.a.
5. Aparna invests ₹ 5,000 at the end of each year at 10% interest p.a. What is the amount she will receive after 4 years?

Answers to Terminal Questions 1

1. (**Hint:** Use rule of 72 and 69) [9 years and 8.98 years)
2. 30,000 × FVIFA(9%, 20Y) = 30,000 × 51.160 = ₹ 15,34,800
3. A × FVIFA(12%, 10y) = 4,00,000 which is 4,00,000/17.549 = ₹ 22,795
4. 20,000 × PVIFA(105, 5y) = 20,000 × 3.791 = ₹ 75,820
5. 5,000 × FVIFA(10%, 4y) = 5,000 × 6.105 = ₹ 23,205

Terminal Questions 2

1. What should be price of a bond which has a par value of ₹ 1,000 carrying a coupon rate of 8% and having a maturity period of 9 years? The required rate of return of the investor is 12%.
2. A bond of ₹ 1,000 value carries a coupon rate of 10% and has a maturity period of 6 years. Interest is payable semi-annually. If the required rate of return is 12%, calculate the value of the bond.
3. A bond whose par value is ₹ 500 bearing a coupon rate of 10% and has a maturity of 3 years. The required rate of return is 8%. What should be the price of the bond?
4. If the current year's dividend is ₹ 24, growth rate of a company is 10% and the required return on the stock is 16%, what is the intrinsic value of the stock?
5. If a stock is purchased for ₹ 120 and held for one year during which time ₹ 15 dividend per share is paid and the price decreases to ₹ 115, what is the nominal return on the share?

Answers to Terminal Questions 2

1. P = Int. × PVIFA(12%, 9y) + Redemption price × PVIF(12%, 10y)

   80 × PVIFA(12%, 9) + 1,000 × PVIF(12%, 9y)

   80 × 5.328 + 1,000 × 0.361

   426.24 + 361 = ₹ 787.24

2. 50 × PVIFA(6% + 12y) + 1,000 × PVIF(6% + 12y)

   50 × 8.384 + 1,000 × 0.497 = ₹ 916.2

3. P = Int. × PVIFA(8%, 3y) + Redemption price × PVIF(8%, 3y)

   50 × 2.577 + 500 × 0.794

   128.85 + 397 = ₹ 525.85

4. Intrinsic value = 24 {(1 + 0.1)}/0.16 – 0.1 = ₹ 440

5. Holding period return = (D1 + Price gain/loss)/purchase price

   {15 + (-5)}/120 = 8.33%

Terminal Questions

1. Ramesh deposited ₹ 4,000 for 3 years period at 12% interest which is credited at the end of every six months. What will be the total amount credited to Ramesh's account at the end of 3 years? [**Ans.** ₹ 5,674]

2. Ganesh plans to send his son for higher studies in America after 5 years. He expects the cost of the study to be ₹ 4,00,000. How much should he save annually to have a sum of ₹ 4,00,00 at the end of 5 years, if the interest rate is 9%?

   [**Ans.** ₹ 2,59,976]

3. ICICI Bank promises to give you ₹ 5,000 after 10 years in exchange of ₹ 2,000 today. What is the interest rate involved in this offer? [**Ans.** 9.50%]

4. Arvind wants to invest @ 8% p.a. compound interest, a such amount as will amount to ₹ 50,000 at the end of three years. How much should he invest? [**Ans.** ₹ 39,691]

5. A company has advertised for deposits from the public. If you deposit ₹ 1,000 now, you receive ₹ 1,464 at the end of 4 years or ₹ 1,611 at the end of 5 years. What rates of interest is the company paying? [**Ans.** 10%]

6. Four equal annual payments of ₹ 4,000 are made into a deposit account that pays 8 per cent per year. What would be the future value of this annuity at the end of 6 years? [**Ans.** ₹ 31,640]

7. You can save ₹ 20,000 a year for 5 years and ₹ 3,000 a year for 10 years thereafter. What will these savings cumulate to at the end of 15 years if the rate of interest is 10 per cent? [**Ans.** ₹ 18,690]

8. Find out the present value of a debenture from the following:

   Face value of Debenture ₹ 1,000

   Annual Interest Rate 15%

   Expected return 12%

   Maturity Period 5 years

   (Present value of Re. 1 at 12% are, 0.8929, 0.7972, 0.7118, 0.6355, 0.5674)

   [**Ans.** PV_d = I (PVAF) + F (DF) = 1,108.12]

9. The share of Ridhi Ltd. (₹ 10) was quoting at ₹ 102 on 1.04.2002 and the price rose to ₹ 132 on 1.04.2005. Dividends were received at 10% on 30th June each year. Cost of Funds was 10% is it worthwhile investment, considering the time value of money.

   [**Ans.** NPV -0.382 is negative, Hence, it is not a wise investment.]

10. The future value of an amount invested or borrowed at a given rate of interest can be calculated if the maturity period is given. Suppose a deposit of ₹ 10,000 gets 10 per cent interest compounded annually for a period of 3 years, the future value will be? [**Ans.** ₹ 13,310]

11. Satish deposits ₹ 1,00,000 with a bank which pays 8 per cent interest compounded annually, for a period of 2 years how much he will get at maturity ?

    [**Ans.** ₹ 1,16,640]

12. CSK deposits ₹ 10,000 with a bank at 12% interest compounded quarterly .How much amount he will get after a period of 6 years? [**Ans.** Rs .20,328]

13. Four equal annual payments of ₹ 5,000 are made into a deposit account that pays 8 per cent interest per year. What is the future value of this annuity at the end of 4 years. [**Ans.** ₹ 22,530.50]

14. A is due to receive ₹ 10,000 at the end of 5 years. Since A is in need of Money Immediately, He wants to sell his Interest to B. B wants a return of 10% per annum on his investment. How much should he pay A? [**Ans.** ₹ 6,209]

15. Krishnamurthy has inherited ₹ 1,000 a year for the next 20 years. First payment being made in one year's time. However, he is in need of money immediately and would like to sell his income to a buyer who would pay him the right price. Assume that the current market rate of interest is 9%:

    (a) What should be the right price he should accept

    (b) How much of his income should he sell if he wants only ₹ 2,500 at present

    (c) If you were interested in buying the income but, if you had only ₹ 5,000 to invest what would you do?

    [**Ans.** (a) ₹ 9128.50, (b) ₹ 726.13, (c) ₹ 452.26]

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

    [**Ans.** ₹ 2,476/3,896]

17. Suppose investments of ₹ 5,000 is made at 13% simple interest rate will in 7 years become:

    FV = PV [1 + (No. of years × Interest rate)] 5,000 [(1 + 7 × 0.13)] = ₹ 9,550

18. Calculate doubling period for two interest rates, 10% and 15% using rule of 69.

    [**Ans.** 7.25, 4.95]

19. Your company currently has 5,000 employees and this number is expected to grow by 5% per year. How many employees will your company have in 10 years?

    [**Ans.** 8,144.5]

20. What is the present value of ₹ 1,000 receivable after 8 years if the rate of discount 15%. [**Ans.** 326.90]

21.

Year	Cash inflows ₹
1	1,000
2	2,000
3	3,000
4	4,000
5	5,000

    Present value at 10% discount factor is 0.909, 0.826, 0.751, 0.683, 0.6621 for 1st 2nd 3rd 4th 5th years. [**Ans.** 10,651]

    Find out the present value of cash flows.

22.

Year	Cash inflows ₹
1	500
2	1,000
3	1,500
4	2,000
5	2,500

    Discount rate = 10% [**Ans.** 5,327]

23. Ms. Sushma wants to find out the present value of ₹ 5,000 to be received 5 years from now, at 10% rate of interest. We have to see 10% column of the 5th year in the present value tables the relevant present value factor is 0.61. [**Ans.** 3,104.63]

24. You deposit ₹ 1,000 annually in a bank for 3 years and your and your deposits earn a compound interest rate of 10%. What will be an annuity at the end of 3 years?

    [**Ans.** 1,331]

25. You deposit ₹ 3,000 annually in a bank for 8 years and your and your deposits earn a compound interest rate of 12%. What will be an annuity at the end of 8 years?

    [**Ans.** 36,899]

26. Suppose you have decided to deposit ₹ 30,000 per year Public provident fund account for 30years. What will be accumulated amount in your public provident fund account at the end of 30 years if the interest rate is 11%. [**Ans.** 59,70,626]

27. You want to buy a house after 5 years when it is expected to cost of ₹ 50 lakhs how much should you save annually if your savings earn a compound interest of 10%.

[**Ans.** 31,03,662.32]

28. A finance company advertises that it will pay a lump sum of ₹ 8,000 at the end of 6 years to investors. Who deposit annually ₹ 1,000 for 6 years what interest rate is implicit in this offer? [**Ans.** 41.5%]

29. A firm decides to make a deposit of ₹ 10,000 at the end of the each year for the next 10 years at 10% rate of interest. What will be the total cumulative deposit at the end of 10 year from today? The firm may also be interested know the total deposit if the rate of interest is 9% or 11% in the case. [**Ans.** 25,940, 23,673, 28,394]

30. You expect to receive ₹ 1,000 annually for 2 years, each receipt occurring at end of the year. What is the present value of this stream of benefits if the discount rate is 10%? [**Ans.** 1,735]

31. A student is awarded a scholarship and two options are placed before him.

    (a) To receive ₹ 1,100 now.

    (b) To receive ₹ 100 pm at the end of each of next 12 months. Which option be 1 chosen if the rate of interest is 12% p.a.? [**Ans.** 2414.66]

32. Find out the present value of an investment, which is expected to give a return ₹ 2,500 p.a. indefinitely, and the rate of interest is 12%. [**Ans.** 20,833]

33. A finance company makes an offer to deposit a sum ₹ 1,100 and then receive a return of ₹ 80 p.a. perpetually. Should this offer be accepted if the rate of interest is 8%. Will the decision change if the rate of interest is 5%.

34. A company is considering which of two mutually exclusive projects it should undertake. The finance Director thinks that the project with the higher NPV should be chosen whereas the managing director thinks that the one with the higher IRR should be undertaken especially as both projects have the same initial outlay and length of life. The company anticipates a cost of capital of 10% and the net after-tax cash flows of the projects are as follows:

Year	**0**	**1**	**2**	**3**	**4**	**5**
Cash Flows (Fig. '000)						
Project X	(200)	35	80	90	75	20
Project Y	(200)	218	10	10	4	3

Required:

1. Calculate the NPV and IRR of each project.

[**Ans.** X–1.146, y–1.094, X–5.985, y–8.53]

2. State, with reasons, which project you would recommend.

35. Ms. Dipti invests ₹ 10,000 in fixed deposit carrying interest at 10% p.a. compounded annually. What will be the value of ₹ 10,000 after two years? [**Ans.** ₹ 12,100]

36. Ms. Jigna wants to receive ₹ 10,000 after two years. If the rate of interest is 10% p.a. how much she should invest today? [**Ans.** ₹ 8,264.50]

37. Find out the present value of ₹ 4,000 received after 7 years if the rate of interest is 15%. [**Ans.** ₹ 1503.76]

38. A project involves cash inflow as given below:

Year	Cash Inflows
2005	10,000
2006	12,000
2007	15,000
2008	20,000

If rate of interest is 15% find out the present value of cash inflows. [**Ans.** ₹ 39,120]

39. Ms. Madhavi has decided to purchase machine costing ₹ 1.00,000 as follows ₹ 20,000 initial payment. ₹ 80,000 out of loan taken. The loan is be repaid in 4 equal annual installments along with interest @ 15% p.a. interest is calculated on the opening outstanding balance. Calculate present value of cash outflow.

40. Mr. Sandeep has undertaken a project which involves cash flow of ₹ 20,000 par year four years. If the rate of interest is 15% find out the preset value of cash inflows.

[**Ans.** ₹ 57,200)

41. Find out the present value of annuity of ₹ 10,000 over three years when discounted at 10%. [**Ans.** ₹ 7,500)

42. Das a principal of the reputed college would like to institute a scholarship of ₹ 1,000 for an outstanding students of T.Y. B.Com every year. She wants to know (present value of investment which would yield 1,000 in perpetuity discounted at 10 %). [**Ans.** ₹ 10,000]

43. Mr. Vikas intends to have a return of ₹ 20,000 p.a. for perpetuity. In case the discount rate is 20%, calculate the present value of this perpetuity ₹ 1,00,000.

[**Ans.** ₹ 1,00,000)

44. Bank of India pays 12% and compounds interest quarterly. If ms jigna deposits ₹ 1,000 initially, how much shall it grow at the end of 5 years? [**Ans.** ₹ 1,806)

45. Following details are available for five independent projects:

Projects	Initial Outlay ₹	Annual Cash Inflows ₹	Life in Years
K	5,00,000	1,20,000	8
L	1,25,000	12,000	15
M	95,000	16,000	18
N	6,000	2,000	5
O	45,000	7,000	10

If cost of capital is 12% and corporate tax rate is 50%mk the above above projects as per the internal rate of return.

46. The project cash flows from two mutually exclusive projects A and B are as under:

Period	Project A	Project B
O (Outflow)	22,000	27,000
1 to 7 (Inflow)	6,000 each year	₹ 7,000 each year
Project life	7 years	7 years

(a) Advice on the project selection with reference to internal rate of return

(b) Will it make any difference in project selection if the cash flow from project is of 8 years instead of 7 years @ 7,000 each year?

PV Factor at	For 7 Years	For 8 Years
15%	4.16	4.49
16%	4.04	4.334
17%	3.92	4.21
18%	3.81	4.08
19%	3.71	3.95
20%	3.60	3.84

[A - 4.31, B - 7.48]

47. Bright Metals Ltd. is considering two different investment proposals. The details are as under:

	Proposal A ₹	Proposal B ₹
Initial outlay	9,500	20,000
Estimated income at the end of		
Year I	4,000	8,000
Year II	4,000	8,000
Year III	4,000	12,000

(a) Suggest the most attractive proposal on the basis of excess present methods considering that future incomes are discounted at 12%.

(b) Also find out the internal rate of return of the two proposals.

48. A company has to select one of the two alternative projects, the practical respect of which are give below:

	Proposal A ₹	Proposal B ₹
Initial outlay	1,20,000	1,10,000
Net cash flow at the end of year		
1	70,000	20,000
2	50,000	40,000
3	30,000	50,000
4	20,000	40,000
5	10,000	20,000
6	Nil	10,000

The company can arrange funds at 15%.

Compute the Net Present Value and Internal Rate of Return of each project and comment on the result.

[NPV A - 1.125, B - 1.07
IRR A - 9.55, B - 2.898]

49. Mona Limited had paid dividend at ₹ 2 per share last year. The estimated growth of the dividends from the company is estimated to be 5% p.a.

Determine the estimated market price of the equity share if the estimated growth rate of dividend (i) rises to 8% (ii) falls to 3%. Also find out the present market' price of the share given that the required rate of the equity investor is 15.5%.

[**Ans.** ₹ 20, ₹ 28.80, ₹ 16.48]

50. Calculate the value of equity share from the following:

Equity Share Capital (₹ 20 each)	₹ 50,00,000
Reserves and Surplus	₹ 5,00,000
15% Secured Loans	₹ 25,00,000
12.5% Unsecured Loans	₹ 10,00,000
Fixed Assets	₹ 30,00,000
Investments	₹ 5,00,000
Operating Profits	₹ 25,00,000
Tax Rate	50%
PIE Ratio	12.5

[**Ans:** ₹ 50]

51. A limited company has a book value per share of ₹ 137.80. Its return on equity is 15% and it follows a policy of retaining 60% of its earnings. If the opportunity cost of capital is 18% what would be the price of the share today?

    [**Ans.** Expected EPS ₹ 20.67. Expected dividend for the current year ₹ 8.27. Growth rate as per Gordon's Models = 0.09. Price per share as per Gordon's Model = ₹ 91.901]

52. Sigma Limited has been growing @ 15% per year and this trend is expected to continue for 5 more years. Thereafter, it is likely to grow @ 8%. The investors expect a return on 12%. The dividend paid by the firm per share for the last year (Do) corresponding to period 0 (To) is ₹ 5.

    Determine the price at which an investor may be ready to buy the shares of the company at the end of T_0 (i.e. now) and T_1, T_2, T_3, T_4 and T_5.

    [**Ans.** T_5: ₹ 271.35. T_4: ₹ 251.29. T_3: ₹ 232.08. T_2: ₹ 214.11. T_1: ₹ 197.15. T_0: ₹ 180.93]

53. LN Limited is currently paying a dividend of ₹ 2 per share. The dividend is expected to grow at 15% annual rate for three years, then at 10% rate for the next three years, after which is expected to grow at a 5% rate forever.

    What is the present value of the share if the capitalisation rate is 9% ?

    [**Ans.** Value of a share at the end of 6 years as per constant growth model ₹ 106.25. This value is discounted *@ 9"10* for 6 years = ₹ 63.33. Therefore, the current price of the share would be ₹ 13.87 (P.V) + 63.33 = ₹ 77.20

54. Tata Chemicals has been expected to grow at 14% per year for the next 4 years and then grow indefinitely at the rate of 5%. The Required Rate of Return on the equity shares is 12%. The company paid dividend of ₹ 2 per share last year.

    Determine the market price of the shares today. .

    [**Ans.** Price at the end of 4 years ₹ 50.71. If this is discounted at 12% for 4 years

    ₹ 32.25. Current market price = 8.37 (PV) + 32.25 = ₹ 40.62]

55. Neha Limited has just paid a dividend of ₹ 2 per share. Its earnings and dividends have shown growth rate of 18% and the same is expected to continue for another 4 years after which the growth will fall to 12% for next 4 years. Thereafter, the growth rate is expected to be 6% forever.

    Find out the market price of the share if the required rate of return of the investors for this risk is 15%.

    [**Ans.** PV ₹ 16.83. M.P at the beginning of the year 9 ₹ 71.85. PV of the M.P. at

    the year 0 is ₹ 23.50. Current market price ₹ 16.83 + 23.50 i.e. ₹ 40.33]

56. A ₹ 1,000 Bond mature in 20 years and offers a 9% coupon rate. The required rate of return is 11 %. Calculated the value of a Bond.

    [**Ans.** PV of Annuity of interest at 11% and 20 payments ₹ 719.67. PV of ₹ 1,000 for 11% and 20 years ₹ 124. Bond value = 840.67 (719.67 + 124)]

57. ABC Limited has issued ₹ 5,000 bond with a 10% coupon rate maturing in 8 years and currently selling at 97%. Required rate of return is 11 %.

    Should the investor go for this bond?

    [**Ans.** PV = ₹ 4743. Current = 97% of 5,000. Price ;= ₹ 4,850.

    The bond is available at a higher price. Hence the investment in this bond is not desirable.] .

58. Cocoraj Limited had sold ₹ 1,000 12% Perpetual Debentures 10 years ago. Interest rates have risen since then. Hence, Debentures are now selling at 15% yield basis.

    (a) Decide the current market price. Would you buy the Debentures at ₹ 750?

    (b) Assume that the Debentures of the company are selling at ₹ 825. If the Debentures have 8 years to run to maturity, calculate the effective yield.

    [**Ans.** (a) Annual interest = ₹ 120. Yield = 15%. Market Price = ₹ 800. If the Debentures are available at ₹ 750, it is advisable to buy.

    (b) YTM = 15.55, i.e., 16%]

59. The Elu Company is contemplating a debenture issue on the following terms:

    Face Value = ₹ 100 per Debenture

    Terms = 7 years

Coupon Rate· = years	1-2	8% p.a.
Of interest	3-4	12% p.a.
	5-7	15% p.a.

    The current market rate of interest on similar Debentures is 15% p.a. The company proposes to price the issue so as to yield a (compound) return of 16% p.a. to the investors.

    Determine the issue price. Assume the redemption on debenture at a premium of 5%. The PV interest factors at 16% p.a. for years 1 to 7 are: 0.862, 0.743; 0.641, 0.552, 0.476, 0.410 and 0.354 respectively.

    [**Ans.** PV of redemption amount ₹ 105 is ₹ 37.17 (105 x 0.354). PV of Debenture is ₹ 45.76 + 37.17 = ₹ 82.93). The company should issue debentures at this value in order to yield a return of 16% to the investors.]

60. The Balance Sheet of XYZ Ltd. as on 31st December, 2008 is given below:

(₹ in *lakhs}*

Liabilities	₹	Assets		₹
Share Capital		Net Fixed Assets		71
(1,00,000 Equity Shares		Current Assets:		
of ₹ 100 each)	100	Inventory	70	
Reserves and Surplus	25	Debtors	12	
Long-term Loans	20	Cash/Bank	2	84
Sundry Creditors	10			
	155			155

Net profits after charging interest and taxes amounted to ₹ 6 lakhs in 2002, ₹ 5 lakhs in 2007 and ₹ 10 lakhs in 2008. For the purpose of share valuation, fixed assets and inventory are to be valued at. ₹ 100 lakhs and ₹ 66 lakhs respectively. Goodwill was agreed to be 3 years' purchases of super profits arrived at as the excess of weighted average net profits of past 3 years over 10% of revised net worth. (Assign weights 1, 2 and 3 years 2006, 2007 and 2008 respectively.)

Assign a fair value for the equity shares on the basis of:

(a) Intrinsic worth and

(b) Capitalised value of future profits,

which is agreed to be the weighted average net profits of past 3 years (on lines indicated above, capitalization rate being 10%.

61. The Balance Sheet of A Ltd. on 31st December, 2008 was as following:

Liabilities	₹	Assets	₹
2,000 12% Preference		Goodwill	30,000
Shares of ₹ 100/-	2,00,000	Land and Building	2,00,000
6,000 Equity Shares of		Machinery	5,00,000
₹ 100/-	6,00,000	Stock	6,00,000
Profit & Loss Account:		Debtors	1,40,000
Opening Balance 90,000		Cash	10,000
Profit for 2008 1.50.000	2,40,000	Preliminary expenses	10,000
Creditors	4,50,000		
	14,90,000		14,90,000

Assets were revalued as below:

Land and Building ₹ 2,50,000. Machinery ₹ 6,50,000. Stock ₹ 4,50,000.

Profits during the last 3 years have shown an increase of ₹ 25,000 per year.

Goodwill may be valued at 3 years purchase of super profit with the normal rate of return of 10%.

Similar companies are paying 12% dividend on equity shares.

Find the value of equity shares.

62. From the following information, ascertain the value of shares.

Balance Sheet on 31st December, 2008

Liabilities	₹	Assets	₹
5,000 Equity Shares of		Goodwill	50,000
₹ 100/-	5,00,000	Land and Building	2,20,000
8% Debentures	2,00,000	Machinery	3,00,000
Profit & Loss Account	2,50,000	Stock	3,00,000
Creditors	1,00,000	Debtors	1,50,000
		Cash	30,000
	10,50,000		10,50,000

Profits for the recent years (after taxation) were as follows:

Year ended 31st December	₹
2008	1,50,000
2007	1,20,000
2006	1,15,000
2005 (Strike Year)	40,000 Loss
2004	75,000

The income tax paid so far was @ 50% which is likely to be 60% in future. Profits till 2008 were ascertained after considering directors' remunerations of ₹ 40,000 per year. Now, Government has approved the payment of ₹ 60,000 per year from 1st January, 2009. The company has been able to secure a contract for supply of material which will reduce the cost by ₹ 40,000 per year for the next 5 years.

You may value goodwill at 3 years' purchase of super profits with the average rate of return of 12%.

63. The Balance Sheet as on 31st December, 2008 is as below:

Liabilities	₹	Assets	₹
20,000 Equity Shares of ₹ 100	2,00,000	Building	1,50,000
		Machinery	1,00,000
General Reserve	60,000	Stock	1,50,000
Profit & Loss Account	35,000		
Bank Overdraft	30,000		
Creditors	40,000		
Provision for tax	50,000		
	4,15,000		4,15,000

Net profits before taxes for the last 5 years were ₹ 41,000; ₹ 64,000; ₹ 70,000; ₹ 85,000 and ₹ 90,000.

Market value of the assets was:

Building ₹ 2,50,000. Machinery ₹ 1,10,000. Stock ₹ 1,40,000.

Taxation may be considered at 50%,

On the basis of above information, find out the net asset value of shares. State assumptions, if any, clearly.

64. Ms. Dipti invests ₹ 10,000 in fixed deposit carrying interest at 10% p.a. compounded annually. What will be the value of ₹ 10,000 after two years '? [**Ans:** ₹ 12, 100]

65. Ms. Jigna wants to receive ₹ 10,000 after two years. If the rate of interest is 10% p.a. how much she should invest today? [**Ans:** ₹ 8264.46]

66. Find out the present value of ₹ 4,000 received after 7 years if the rate of interest is 15%. **[Ans. ₹ 2,052]**

67. A project involves cash inflow as given below:

Year	Cash inflows ₹
2005	10,000
2006	12,000
2007	15,000
2008	20,000

If the rate of interest is 15%, find out the present value of cash inflows.

[**Ans.** ₹ 39.082]

68. Ms Madhavi has decided to purchase machine costing ₹ 1,00,000 as follows:

₹ 20,000 Initial payment. ₹ 80,000 out of loan taken. The loan is to be repaid in 4 equal annual instalments along with interest @ 15% p.a. Interest is calculated on the opening outstanding balance. Calculate present value of cash outflow.

[**Ans.** ₹ 1.00,0281]

69. Mr. Sandeep has undertaken a project which involves cash flow of ₹ 20,000 per year for four years. If the rate of interest is 15%, find out the present value of cash inflows.

[**Ans.** ₹ 57,100]

70. Find out the present value of annuity of ₹ 10,000 over three years when discounted at 10%. [**Ans.** ₹ 24, 870]

71. Mrs. Das a principal of the reputed college would like to institute a scholarship of ₹ 1,000 for an outstanding students of T.Y. B.Com every year. She wants to know the present value of investment which would yield 1000 in perpetuity discounted at 10%. [**Ans.** ₹ 10,000]

72 Mr. Vikas intends to have a return of ₹ 20,000 p.a. for perpetuity. In case the discount rate is 20%. Calculate the present value of this perpetuity. [**Ans.** ₹ 1,00,000}

73. Bank of India pays 12% and compounds interest quarterly. If Ms Ligna deposits ₹ 1000 initially, how much shall it grow at the end of 5 years? [**Ans.** ₹ 1,806]

74. Following details are available for five independent projects:

Projects	**Initial Outlay**	**Annual Cash Inflows** ₹	**Life in Years** ₹
K	5,00,000	1,20,000	8
L	1,25,000	12,000	15
M	95,000	16,000	18
N	6,000	2,000	5
O	45,000	7,000	10

If cost of capital is 12% and corporate tax rate is 50%, rank the above projects as per the Internal Rate of Return.

75. The project cash flows from two mutually exclusive projects A and B are as under:

Period	Project A	Project B
0 (Outflow)	₹ 22,000	₹ 27.000
1 to 7 (Inflow)	₹ 6.000 each year	₹ 7,000 each year
Project life	7 years	7 years

(a) Advise on the project selection with reference to Internal Rate of Return.

(b) Will it make any differences in project selection if the cash flow from Project B is of 8 years instead of 7 years @ ₹ 7.000 each year?

PV Factor at	For 7 years	For 8 years
15%	4.16	4.49
16%	4.04	4.34
17%	3.92	4.21
18%	3.81	4.08
19%	3.71	3.95
20%	3.60	3.84

(C.S.)

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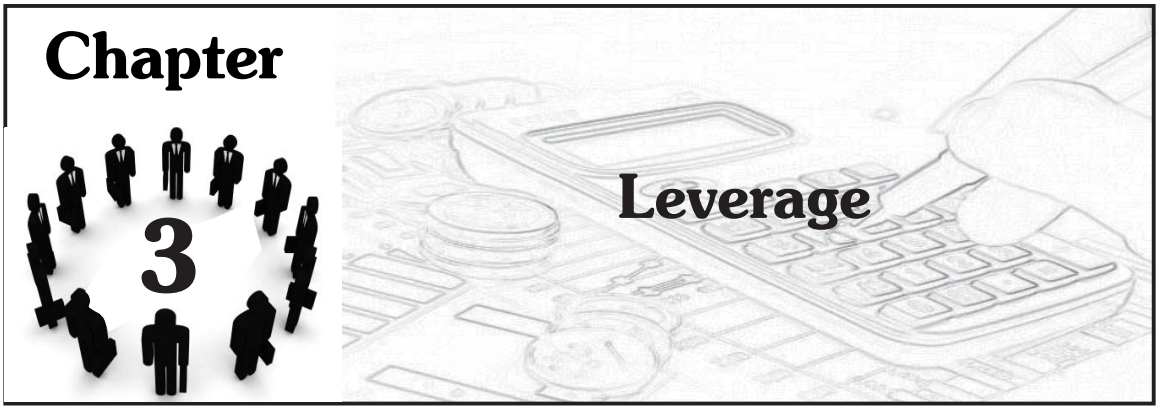


Introduction

A company uses different sources of financing to fund its activities. These sources can be classified as those which carry a fixed rate of return and those whose returns vary. The fixed sources of finance have a bearing on the return on shareholders. Borrowing funds as loans have an impact on the return on shareholders and this is greatly affected by the magnitude of borrowing in the capital structure of a firm. Leverage is the influence of power to achieve something. The use of an asset or source of funds for which the company has to pay a fixed cost or fixed return is termed as leverage. Leverage is the influence of an independent financial variable on a dependent variable. It studies how the dependent variable responds to a particular change in independent variable.

There are two types of leverage – *Operating Leverage and Financial Leverage*. Leverage associated with the asset purchase activities is known as operating leverage, while those associated with financing activities is called as financial leverage.

Operating Leverage: Operating leverage arises due to the presence of fixed operating expenses in the firm's income flows. A company's operating costs can be categorized into three main sections:

- **Fixed costs** are those which do not vary with an increase in production or sales activities for a particular period of time. These are incurred irrespective of the income and volume of sales and generally cannot be reduced.
- **Variable costs** are those which vary in direct proportion to output and sales. An increase or decrease in production or sales activity will have a direct effect on such types of costs incurred.
- **Semi-variable costs** are those which are partly fixed and partly variable in nature. These costs are typically of fixed nature up to a certain level beyond which they vary with the firm's activities.

The operating leverage is the firm's ability to use fixed operating costs to increase the effects of change in sales on its earnings before interest and taxes. Operating leverage occurs any time a firm has fixed costs. The percentage change in profits with a change in volume of sales is more than the percentage change in volume.

Illustration 1. A firm sells a product for ₹ 10 per unit, its variable costs are ₹ 5 per unit and fixed expenses amount to ₹ 5,000 p.a. Show the various levels of EBIT that result from sale of 1000 units, 2000 units and 3000 units.

Solution:

Sales in units	1,000	2,000	3,000
Sales revenue ₹	10,000	20,000	30,000
Variable cost	5,000	10,000	15,000
Contribution	5,000	10,000	15,000
Fixed cost	5,000	5,000	5,000
EBIT	000	5,000	10,000

If we take 2,000 units as the normal course of sales, the results can be summed as under:

- A 50% increase in sales from 2,000 units to 3,000 units results in a 100% increase in EBIT.
- A 50% decrease in sales from 2,000 units to 1,000 units results in a 100% decrease in EBIT.

The illustration clearly tells us that when a firm has fixed operating expenses, an increase in sales results in a more proportionate increase in EBIT and *vice versa.* The former is a favourable operating leverage and the latter is unfavourable.

Another way of explaining this phenomenon is examining the effect of the degree of operating leverage DOL. The DOL is a more precise measurement. It examines the effect of the change in the quantity produced on EBIT.

DOL – % change in EBIT/% change in output

To put in a different way (ΔEBIT/EBIT)/ΔQ/Q)

EBIT is Q(S–V) – F where Q is quantity, S is sales, V variable cost and F is fixed cost

Substituting this we get, (Q(S–VI)/(Q(S–V)–F)

Example: Calculate the DOL of Guptha Enterprises.

Quantity produced and sold – 1000 units

Variable cost – ₹ 200 per unit

Selling price per unit – ₹ 300 per unit

Fixed expenses – ₹ 20,000

Solution:

DOL = {Q(S–V)} / {Q(S–V)–F}

= 1,000 (300 – 200) – 20,000

= 1,00,000/20,000

DOL = 1.25

If the company does not incur any fixed operating costs, there is no operating leverage.

Illustration 2.

Sales in units	1,000
Sales revenue ₹	10,000
Variable cost	5,000
Contribution	5,000
Fixed cost	0
EBIT	5,000

Solution:

DOL= {Q(S—V)} / {Q(S—V)—F}

{1,000(5,000)} / {1,000(5,000) – 0}

= 50,00,000/50,00,000

= **DOL=1**

As operating leverage can be favourable or unfavourable, high risks are attached to higher degrees of leverage. As DOL considers fixed expenses, a larger amount of these expenses increases the operating risks of the company and hence, a higher degree of operating leverage. Higher operating risks can be taken when income levels of companies are rising and should not be ventured into when revenues move southwards.

Application of Operating Leverage

Measurement of business risk: Risk refers to the uncertain conditions in which a company performs. Greater the DOL, more sensitive is the EBIT to a given change in unit sales. A high DOL is a measure of high business risk and *vice versa.*

Production planning: A change in production method increases or decreases DOL. A firm can change its cost structure by mechanizing its operations, thereby, reducing its variable costs and increasing its fixed costs. This will have a positive impact on DOL. This situation can be justified only if the company is confident of achieving a higher amount of sales thereby increasing its earnings.

Financial Leverage

Financial leverage as opposed to operating leverage relates to the financing activities of a firm and measures the effect of EBIT on EPS of the company. A company's sources of funds fall under two categories — those which carry a fixed financial charge – debentures, bonds and preference shares and those which do not carry any fixed charge – equity shares. Debentures and bonds carry a fixed rate of interest and have to be paid off irrespective of the firm's revenues. Though dividends are not contractual obligations, dividend on preference shares is a fixed charge and should be paid off before equity shareholders are paid any. The equity holders are entitled to only the residual income of the firm after all prior obligations are met.

Financial leverage refers to the mix of debt and equity in the capital structure of the firm. This results from the presence of fixed financial charges in the company's income stream. Such expenses have nothing to do with the firm's performance and earnings and should be paid off regardless of the amount of EBIT. It is the firm's ability to use fixed financial charges to increase the effects of changes in EBIT on the EPS. It is the use of funds obtained at fixed costs to increase the returns to shareholders. A company earning more by the use of assets, funded by fixed sources is said to be having a favourable or positive leverage. Unfavourable leverage occurs when the firm is not earning sufficiently to cover the cost of funds. Financial leverage is also referred to as **"Trading on Equity".**

Illustration 3. The EBIT of a firm is expected to be ₹ 10,000. The firm has to pay interest @ 5% on debentures worth ₹ 25,000. It also has preference shares worth ₹ 15,000 carrying a dividend of 8%. How does EPS change if EBIT is ₹ 5,000 and ₹ 15,000? Tax rate may be taken as 40% and number of outstanding shares as 1000.

Solution:

EBIT	**10,000**	**5,000**	**15,000**
Interest on debt	1,250	1,250	1,250
EBT	8,750	3,750	13,750
Tax 40%	3,500	1,500	5,500
EAT	5,250	2,250	8,250
Preference div.	1,200	1,200	1,200
Earnings available to equity holders	4,050	1,050	7,050
EPS	4.05	1.05	7.05

Interpretation:

- A 50 % increase in EBIT from ₹ 10,000 to ₹ 15,000 results in 74% increase in EPS.
- A 50 % decrease in EBIT from ₹ 10,000 to ₹ 5,000 results in 74% decrease in EPS.

This example shows that the presence of fixed interest source funds leads to a more than proportional change in EPS. The presence of such fixed sources implies the presence of financial leverage. This can be expressed in a different way. The degree of financial leverage DFL is a more precise measurement. It examines the effect of the fixed sources of funds on EPS.

$$DFL = \frac{\% \text{ change in EPS}}{\% \text{ change in EBIT}}$$

$$DFL = \{\Delta EPS/EPS\} + (\Delta EBIT/EBIT\}$$

$$\text{or } DFL = EBIT + \{EBIT - I - \{Dp(1-T)\}$$

I is interest, Dp is dividend on preference shares, T is tax rate.

Illustration 3. Kusuma Cements Ltd. has an EBIT of ₹ 5,00,000 at 5,000 units production and sales. The capital structure is as follows:

Capital structure	Amount ₹
Paid up capital 500000 equity shares of ₹ 10 each	50,00,000
12% Debentures	4,00,000
10% Preference shares of ₹ 100 each	4,00,000
Total	58,00,000
Corporate tax rate may be taken at 40%	

Solution:

EBIT	5,00,000
Less: Interest on debentures	48,000
EBT	4,52,000
DFL = EBIT ÷ {EBIT—I—{Dp/(1-T)}}	5,00,000
(5,00,000—48,000—{40,000/(1—0.40)}	
DFL =	1.30

Use of Financial Leverage

Studying DFL at various levels makes financial decision making on the use of fixed sources of funds for funding activities easy. One can assess the impact of change in EBIT on EPS.

Like operating leverage, the risks are high at high degrees of financial leverage. High financial costs are associated with high DFL. An increase in financial costs implies higher level of EBIT to meet the necessary financial commitments. A firm not capable of honouring its financial commitments may be forced to go into liquidation by the lenders of funds. The existence of the firm is shaky under these circumstances. On the one hand trading on equity improves considerably by the use of borrowed funds and on the other hand, the firm has to constantly work towards higher EBIT to stay alive in the business. All these factors should be considered while formulating the firm's mix of sources of funds. One main goal of financial planning is devise a capital structure in order to provide a high return to equity holders. But at the same time, this should not be done with heavy debt financing which drives the company on to the brink of winding up.

Impact of financial leverage: Highly leveraged firms are considered very risky and lenders and creditors may refuse to lend them further to fuel their expansion activities. On being forced to continue lending, they may do so with their own conditions like earning a minimum of X% EBIT or stipulating higher interest rates than the market rates or no further mortgage of securities. Financial leverage is considered to be favourable till such time that the rate of return exceeds the rate of return obtained when no debt is used. This can be explained with the help of the following:

Illustration 4. Following are the balance sheets of 2 firms A and B.

Balance Sheet of A				Balance Sheet of B			
Equity Capital	1,00,000	Assets	1,00,000	Equity Capital	40,000	Assets	1,00,000
				Debt @ 15	60,000		
Total	1,00,000	Total	1,00,000	Total	1,00,000	Total	1,00,000

Both the companies earn an income before interest and tax of ₹ 40000. Calculate the DFL and interpret the results thereof.

Solution:

$$DFL = \frac{EBIT}{EBIT - 1 - \{Dp/(1-T)\}}$$

$$\text{Company A} = \frac{40,000}{40,000 - 0 - 0} = 1$$

$$\text{Company B} = \frac{40,000}{40,000 - 9,000 - 0} = 1.29$$

The company not using debt to finance its assets has a higher DFL. Financial leverage does not exist when there is no fixed charge financing.

Total or Combined Leverage

The combination of operating and financial leverage is called *Combined Leverage*. Operating leverage affects the firm's operating profit EBIT and financial leverage affects PAT or the EPS. These cause wide fluctuation in EPS. A company having a high level of operating or financial leverage will find a drastic change in its EPS even for a small change in sales volume. Companies whose products are seasonal in nature have fluctuating EPS, but the amount of changes in EPS due to leverages is more pronounced. The combined effect is quite significant for the earnings available to ordinary shareholders. Combined leverage is the product of DOL and DFL.

$$DTL = \frac{Q(S - V)}{Q(S - V)\ F - I - \{Dp/1\_T)\}}$$

Illustration 5. Calculate the DTL of M/s Pooja Enterprises Ltd. given the following information.

Quantity sold 10,000 units

Variable cost per unit ₹ 100 per unit

Selling price per unit ₹ 500 per unit

Fixed expenses ₹ 1,00,0000

Number of equity shares 1,00,000

Debt ₹ 10,00,000 @ 20% interest

Preference shares 10,000 shares of ₹ 100 each @ 10% dividend

Tax rate 50%

Solution:

$$\textbf{DTL} = \frac{(Q(S-V)}{Q((S-V)-F-1-\{Dp/(1-T)\}}$$

$$\frac{10,000\,(500-100)}{10,000\,(500-100)-1,00,000-2,00,000-\{1,00,000/0.5\}}$$

DTL=1.54

Cross verification:

$$\textbf{DOL} = \frac{\{Q(S-V)\}}{\{Q(S-V)-F\}}$$

$$= \frac{10,000\,(500-100)}{10,000\,(500-100)-10,00,000}$$

DOL = 1.33

$$\textbf{DFL} = \frac{EBIT}{EBIT-\{Dp/(1=T)\}}$$

$$= \frac{30,00,000}{30,00,000-20,000-\{1,00,000/0.5\}}$$

DFL = 1.15

DTL = DOL × DFL

1.33 × 1.15 = 1.53

Uses of DTL: DTL measures the total risk of the company as it is a combined measure of both operating and financial risk. It measures the variability of EPS.

Illustration 6: The following information has been collected from the annual report of Garden Silks. What is the degree of financial leverage?

Total sales	₹ 14,00,000
Contribution ratio	25%
Fixed expenses	₹ 1,50,000
Outstanding bank loan	₹ 4,00,000 @ 12.5%
Applicable tax rate	40%

Solution: DFL = EBIT / (EBIT-I) = 2,00,000/2,00,000 – 50,000 = **1.33**

EBIT = Sales × 25% less fixed expenses

14,00,000 × 25% = 3,50,000 – 1,50,000 = 2,00,000

Illustration 7: X and Y have provided the following information. Which firm do you consider risky?

	X Ltd.	**Y Ltd.**
Sales in units	40,000	40,000
Price per unit	60	60
Variable cost p.u.	20	25
Fixed financing cost	₹ 1,00,000	₹ 50,000
Fixed financing cost	₹ 3,00,000	₹ 2,00,000

Solution: DOL = Q(S-V) / Q(S-V)-F

Company X : 40,000(60-20) / 40,000(60-20)-4,00,000
16,00,000/12,00,000 = **1.33**

Company Y : 40,000(60-25) / 40,000(60-25) – 2,50,000
14,00,000/11,00,000= **1.22**

Therefore as per operating leverage X Ltd. is more risky then Y Ltd.

Illustration 8. Calculate EPS with the following information.

EBIT	₹ 11,80,000
Interest	₹ 2,20,000
No. of shares outstanding	40,000
Tax rate applicable	40%
Solution: EBIT	11,80,000
Less: Interest	9,60,000
Tax 40%	3,84,000
EAT	5,76,000

EPS = EAT/No. of shares outstanding

5,76,000/40,000 = **₹ 14.4**

Illustration 9. The leverages of three firms are given below. Which one of the combinations should be chosen for the combined leverage to be maximum and what are the inferences?

	A	B	C
Operating leverage	1.14	1.23	1.33
Financial leverage	1.27	1.3	1.33

Solution: We should calculate the combined leverage to draw inferences. Combined leverage of A is 1.14 × 1.27 = 1.45,

Combined leverage of B is 1.23 × 1.3 = 1.60,

Combined leverage of C is 1.33 × 1.33 = 1.77

We find that the combined leverage is highest for firm C and this suggests that this firm is working under very high risky situation.

CAPITAL STRUCTURE

Introduction: The capital structure of a company refers to the mix of long-term finances used by the firm. In short, it is the financing plan of the company. With the objective of maximizing the value of the equity shares, the choice should be that pattern of using debt and equity in a proportion that will lead towards achievement of the firm's objective. The capital structure should add value to the firm. Financing mix decisions are investment decisions and have no impact on the operating earnings of the firm. Such decisions influence the firm's value through the earnings available to the shareholders.

The value of a firm is dependent on its expected future earnings and the required rate of return. The objective of any company is to have an ideal mix of permanent sources of funds in a manner that will maximize the company's market price. The proper mix of funds is referred to as *Optimal Capital Structure.*

The capital structure decisions include debt-equity mix and dividend decisions. Both these have an effect on the EPS.

Features of an Ideal Capital Structure:

- **Profitability:** The firm should make maximum use of leverage at minimum cost.
- **Flexibility:** It should be flexible enough to adapt to changing conditions. It should be in a position to raise funds at the shortest possible time and also repay the moneys it borrowed, if they appear to be expensive. This is possible only if the company's lenders have not put forth any conditions like restricting the company from taking further loans, no restrictions placed on the assets usage or laying a restriction on early repayments. In other words, the finance authorities should have the power to take decisions on the basis of the circumstances warrant.
- **Control:** The structure should have minimum dilution of control.
- **Solvency:** Use of excessive debt threatens the very existence of the company. Additional debt involves huge repayments. Loans with high interest rates are to be

avoided, however, attractive some investment proposals look. Some companies resort to issue of equity shares to repay their debt for equity holders do not have a fixed rate of dividend.

Factors Affecting Capital Structure

Leverage: The use of fixed charge sources of funds such as preference shares, loans from banks and financial institutions and debentures in the capital structure is known as "trading on equity" or "financial leverage". Creditors insist on a debt equity ratio of 2:1 for medium sized and large sized companies, while they insist on 3:1 ratio for SSI. Debt equity ratio is an indicator of the relative contribution of creditors and owners. The debt component includes both long-term and short-term debt and this is represented as Debt/Equity. A debt equity ratio of 2:1 indicates that for every 1 unit of equity, the company can raise 2 units of debt. By normal standards, 2:1 is considered a healthy ratio, but it is not always a hard and fast rule that this standard is insisted upon. A ratio of 1.5:1 is considered good for a manufacturing company while a ratio of 3:1 is good for heavy engineering companies. It is generally perceived that lower the ratio, higher is the element of uncertainty in the minds of lenders.

Increased use of leverage increases commitments of the company, the outflows being in the nature of higher interest and principal repayments, thereby increasing the risk of the equity shareholders. The other factors to be considered before deciding on an ideal capital structure are:

- **Cost of capital:** High cost funds should be avoided however attractive an investment proposition may look like, for the profits earned may be eaten away by interest repayments.
- **Cash flow projections of the company:** Decisions should be taken in the light of cash flows projected for the next 3-5 years. The company officials should not get carried away at the immediate results expected. Consistent lesser profits are any way preferable than high profits in the beginning and not being able to get any after 2 years.
- **Size of the company**
- **Dilution of control:** The top management should have the entire flexibility to take appropriate decisions at the right time. The capital structure planned should be one in this direction.
- **Floatation costs:** A company desiring to increase its capital by way of debt or equity will definitely incur floatation costs. Effectively, the amount of money raised by any issue will be lower than the amount expected because of the presence of floatation costs. Such costs should be compared with the profits and right decisions taken.

Theories of Capital Structure: As we are aware, equity and debt are the two important sources of long-term sources of finance of a firm. The proportion of debt and equity in a firm's capital structure has to be independently decided case to case. A proposal though not being favourable to lenders may be taken up if they are convinced with the earning potential and long-term benefits. Many theories have been propounded to understand the relationship between financial leverage and firm value.

Assumptions: The following are some common assumptions made:

- The firm has only two sources of funds – debt and ordinary shares.
- There are no taxes – both corporate and personal.
- The firm's dividend payout ratio is 100%, that is, the firm pays off the entire earnings to its equity holders and retained earnings are zero.
- The investment decisions of a company are constant, that is, the firm does not invest any further in its assets.
- The operating profits EBIT are not expected to increase or decline.
- All investors shall have identical subjective probability distribution of the future expected EBIT.
- A firm can change its capital structure at a short notice without the occurrence of transaction costs.
- The life of the firm is indefinite.

Based on the above, we derive the following:

1. Debt capital being constant, Kd is the cost of debt which is the discount rate at which discounted future constant interest payments are equal to the market value of debt, that is, **Kd = I/B** where, I refers to total interest payments and B is the total market value of debt. Therefore value of the debt **B = I/Kd**
2. Cost of equity capital **Ke = (D1/P0) + g** where D1 is dividend after one year, P0 is the current market price and g is the expected growth rate.
3. Retained earnings being zero, **g = br** where r is the rate of return on equity shares and b is the retention rate, therefore g is zero. Now we know **Ke = E1/P0 + g** and **g being zero**, so **Ke = NI/S** where NI is the net income to equity holders and S is market value of equity shares.
4. The net operating income being constant, overall cost of capital is represented as **Ko = W1K1 + W2K2.**

That is, **Ko = (B/V)K1 + (S/V)K2** where B is the total market value of the debt, S market value of equity and V total market value of the firm (B+S). The above equation can be expressed as **[B/(B+S)]K1 + [S/(B+S)]K2**, (K1 being the debt component and Ke being the equity component) which can be expressed as **Ko = I + NI/V or EBIT/V** or in other words, **net operating income/market value of firm.**

Net Income Approach: This theory is suggested by Durand and he is of the view that capital structure decision is relevant to the valuation of the firm. Any change in the financial leverage will have a corresponding change in the overall cost of capital and also the total value of the firm. As the ratio of debt to equity increases, the WACC declines and market value of firm increases. The NI approach is based on 3 assumptions – no taxes, cost of debt less than cost of equity and use of debt does not change the risk perception of investors.

We know that **Ko = [B/(B+S)]Kd + [S/(B+S)]Ke**

The following graphical representation of net income approach may help us understand this better.

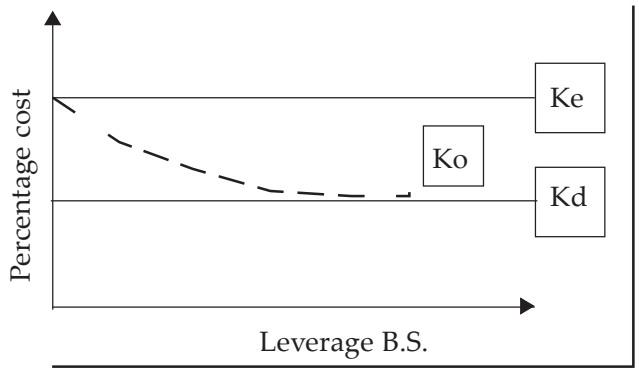


Illustration 10: Given below are two firms A and B, which are identical in all aspects except the degree of leverage employed by them. What is the average cost of capital of both firms?

	Firm A	Firm B
Net operating income EBIT	₹ 1,00,000	₹ 1,00,000
Interest on debentures I	Nil	₹ 25,000
Equity earnings E	₹ 1,00,000	₹ 75,000
Cost of equity Ke	15%	15%
Cost of debentures Kd	10%	10%
Market value of equity S = E/Ke	₹ 6,66,667	₹ 50,000
Market value of debt B	Nil	₹ 2,50,000
Total value of firm V	₹ 6,66,667	₹ 7,50,000

Solution:

Average Cost of capital of firm A is:

10% × 0/₹ 6,66,667 + 15% × 6,66,667/6,66,667 which is **15%**

Average Cost of capital of firm B is:

10% × 25,000/7,83,333 + 15% × 5,33,333/7,83,333 which is **13.4%**

Interpretation: The use of debt has caused the total value of the firm to increase and the overall cost of capital to decrease.

Net Operating Income Approach: This theory is again propounded by Durand and is totally opposite of the Net Income Approach. He says any change in leverage will not lead to any change in the total value of the firm, market price of shares and overall cost of capital. The overall capitalization rate is the same for all degrees of leverage. We know that:

Ko = [B/(B+S)]Kd + [S/(B+S)]Ke

As per the NOI approach the overall capitalization rate remains constant for all degrees of leverage. The market values the firm as a whole and the split in the capitalization rates between debt and equity is not very significant.

The increase in the ratio of debt in the capital structure increases the financial risk of equity shareholders and to compensate this, they expect a higher return on their investments. Thus the cost of equity is

Ke = Ko +[(Ko – Kd)(B/S)]

Cost of debt: The cost of debt has two parts – explicit cost and implicit cost. Explicit cost is the given rate of interest. The firm is assumed to borrow irrespective of the degree of leverage. This can mean that the increasing proportion of debt does not affect the financial risk of lenders and they do not charge higher interest. Implicit cost is increase in Ke attributable to Kd. Thus, the advantage of use of debt is completely neutralized by the implicit cost resulting in Ke and Kd being the same.

Graphically this is represented as:

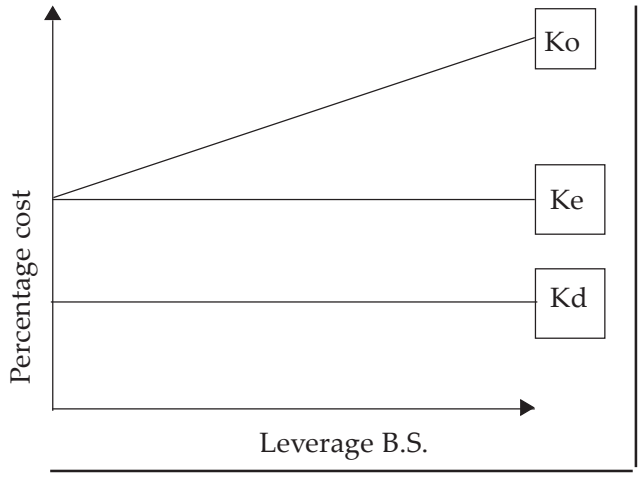


Illustration 11: Given below are two firms X and Y which are similar in all aspects except the degree of leverage employed.

	Firm A	Firm B
Net operating income EBIT	₹ 10,000	₹ 10,000
Overall capitalization rate Ko	18%	18%
Total market value V = EBIT/Ko	55,555	55,555
Interest on debt I	₹ 1,000	₹ 2,000
Debt capitalization rate Kd	11%	11%
Market value of debt B = I/Kd	₹ 9,091	₹ 18,181
Market value of equity S = V—B	₹ 4,64,64	₹ 37,374
Leverage B/S	0.1956	0.2140

Solution:

The equity capitalization rates are

Firm A = 9,000/46,464 which is 19.36%

Firm B = 8,000/37374 which is 21.40%

The equity capitalization rates can also be calculated with the formula

Ke = Ko +[(Ko – Kd)(B/S)]

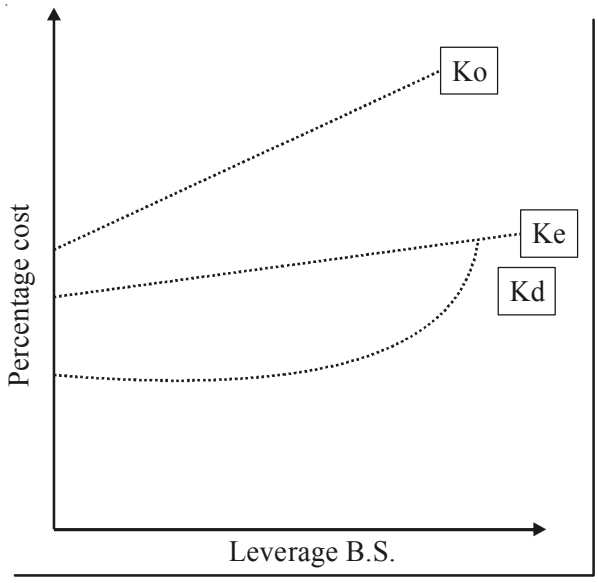
Firm A = 0.18 + [(0.18 – 0.11)(0.1956)] = 19.36%

Firm B = 0.18 + [(0.18 – 0.11)(0.4865)] = 21.40%

Traditional Approach: The Traditional Approach has the following propositions:

- Kd remains constant until a certain degree of leverage and thereafter rises at an increasing rate.
- Ke remains constant or rises gradually until a certain degree of leverage and thereafter rises very sharply.
- As a sequence to the above 2 propositions, Ko decreases till a certain level, remains constant for moderate increases in leverage and rises beyond a certain point.

Graphically, we can represent these as under:



Miller and Modigliani Approach: Miller and Modigliani criticize that the cost of equity remains unaffected by leverage up to a reasonable limit and Ko being constant at all degrees of leverage. They state that the relationship between leverage and cost of capital is elucidated as in NOI approach. The assumptions for their analysis are:

- **Perfect capital markets:** Securities can be freely traded, that is, investors are free to buy and sell securities (both shares and debt instruments), there are no hindrances

on the borrowings, no presence of transaction costs, securities infinitely divisible, availability of all required information at all times.

- **Investors behave rationally**, that is, they choose that combination of risk and return that is most advantageous to them.
- **Homogeneity** of investors risk perception, that is, all investors have the same perception of business risk and returns.
- **Taxes:** There is no corporate or personal income tax.
- **Dividend payout is 100%**, that is, the firms do not retain earnings for future activities.

Basic propositions: The following three propositions can be derived based on the above assumptions:

Proposition I: The market value of the firm is equal to the total market value of equity and total market value of debt and is independent of the degree of leverage. It can be expressed as:

Expected NOI

Expected overall capitalization rate

V + (S+D) which is equal to **O/Ko** which is equal to **NOI/Ko**

V + (S+D) = O/Ko = NOI/Ko

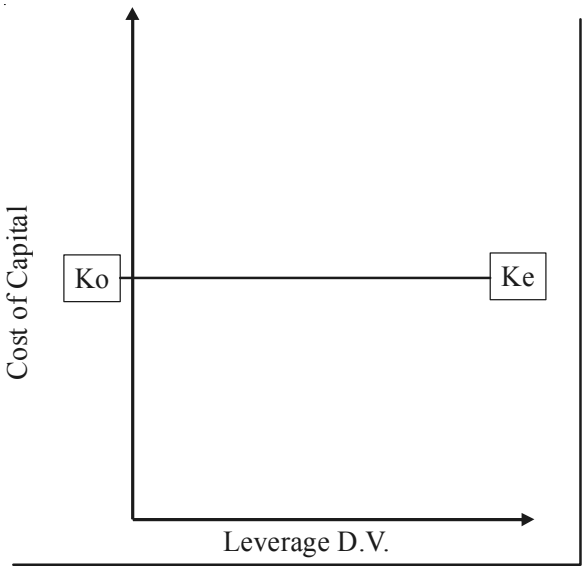
Where V is the market value of the firm,

S is the market value of the firm's equity,

D is the market value of the debt,

O is the net operating income,

Ko is the capitalization rate of the risk class of the firm.



The basic argument for proposition I is that equilibrium is restored in the market by the arbitrage mechanism. Arbitrage is the process of buying a security at lower price in one market and selling it in another market at a higher price bringing about equilibrium. This is a balancing act. Miller and Modigliani perceive that the investors of a firm whose value is higher will sell their shares and in return buy shares of the firm whose value is lower. They will earn the same return at lower outlay and lower perceived risk. Such behaviours are expected to increase the share prices whose shares are being purchased and lowering the share prices of those share which are being sold. This switching operation will continue till the market prices of identical firms become identical.

Proposition II: The expected yield on equity is equal to discount rate (capitalization rate) applicable plus a premium.

Ke = Ko +[(Ko—Kd)D/S]

Proposition III: The average cost of capital is not affected by the financing decisions as investment and financing decisions are independent.

Criticisms of MM Proposition

Risk perception: The assumption that risks are similar is wrong and the risk perceptions of investors are personal and corporate leverage is different. The presence of limited liability of firms in contrast to unlimited liability of individuals puts firms and investors on a different footing. All investors lose if a levered firm becomes bankrupt but an investor loses not only his shares in a company but would also be liable to repay the money he borrowed. Arbitrage process is one way of reducing risks. It is more risky to create personal leverage and invest in unlevered firm than investing in levered firms.

Convenience: Investors find personal leverage inconvenient. This is so because it is the firm's responsibility to observe corporate formalities and procedures whereas it is the investor's responsibility to take care of personal leverage. Investors prefer the former rather than taking on the responsibility and thus, the perfect substitutability is subject to question.

Transaction costs: Another cost that interferes in the system of balancing with arbitrage process is the presence of transaction costs. Due to the presence of such costs in buying and selling securities, it is necessary to invest a higher amount to earn the same amount of return.

Taxes: When personal taxes are considered along with corporate taxes, the Miller and Modigliani approach fails to explain the financing decision and firm's value.

Agency costs: A firm requiring loan approach creditors and creditors may sometimes impose protective covenants to protect their positions. Such restriction may be in the nature of obtaining prior approval of creditors for further loans, appointment of key persons, restriction on dividend payouts, limiting further issue of capital, limiting new investments or expansion schemes etc.

Illustration 12: Jigna Ltd. sells 1,00,000 units of product. Selling price is ₹ 10 per unit and variable cost is ₹ 3, if the fixed cost for the year amounts to ₹ 4,00,000, find out the effect on profit, if the company sells 1,10,000 units and 80,000 units.

Solution:

Particulars	Amt. (₹)	Amt. (₹)	Amt . (₹)
Units	1,00,000	1,10,000	80,000
Sales	10,00,000	11,00,000	8,00,000
(–) Variable cost	3,00,000	3,30,000	2,40,000
Contribution	7,00,000	7,70,000	5,60,000
(–) Fixed cost	4,00,000	4,00,000	4,00,000
Profit	3,00,000	3,70,000	1,60,000

Comment: The companies profit when the sales is 1,10,000 units, the profit is ₹ 3,70,000 and when the sales are 80,000 units, the profit is ₹ 1,60,000 i.e. 10% increase in sales increase profit by 23.33% and 20% decrease in sales, reduces profit by 46.67%

Illustration 13. Ambika Ltd. sells 2,000 units per annum. The selling price per unit is ₹ 300 and the variable cost per unit is ₹ 70. The fixed operating cost is ₹ 60,000.

Calculate operating leverage.

Solution:

Particulars	Amt. (Rs.)
Sales (2000 x 300)	6,00,000
(–) Variable cost (70 x 2000)	1,40,000
Contribution	4,60,000
(–) Fixed Cost	60,000
PBIT	4,00,000

$$\text{Operating Leverage} = \frac{\text{Contribution}}{\text{PBIT}}$$

$$= \frac{4,60,000}{4,00,000}$$

$$= 1.15$$

Illustration 14. Y Ltd. sells its product at ₹ 20 per unit. Variable cost per unit is ₹ 15. Find out the degree of operating leverage for sale of 3,000 units, and 3,500 units. What do you understand from the degree of operating leverage of these sales volumes? Fixed cost is ₹ 10,000.

Solution:

Particulars	Amt. (₹)	Amt. (₹)
Units	3,000	3,500
Sales	60,000	70,000
(–) Variable cost	45,000	52,500
Contribution	15,000	17,500
(–) Fixed cost	10,000	10,000
PBIT	**5,000**	**7,500**

$$\text{Operating Leverage (3000 units)} = \frac{\text{Contribution}}{\text{PBIT}}$$

$$= \frac{15,000}{5,000}$$

$$= 3$$

$$\text{Operating Leverage (3000 units)} = \frac{\text{Contribution}}{\text{PBIT}}$$

$$= \frac{1,75,000}{7,500}$$

$$= 2.3$$

Higher units/sales, results into lower operating/business risk and vice versa.

Illustration 15. Compute financial leverage from the following information:

Particulars	Amt. ₹
Interest	10,000
Sales (1,000 units)	1,00,000
Variable Cost	50,000
Fixed Cost	30,000

Solution:

Particulars	Amt . (₹)
Sales	1,00,000
(–) Variable cost	50,000
Contribution	50,000
(–) Fixed cost	30,000
PBIT	20,000
(–) Interest	10,000
PBIT	**10,000**

$$\text{Financial Leverage} = \frac{\text{PBIT}}{\text{PBT}}$$

$$= \frac{20,000}{10,000}$$

$$= 2$$

Illustration 16. Shruti Ltd. has the following structure:

Particulars	(₹)
Equity share capital	5,00,000
10% preference share capital	5,00,000
8% debentures	5,50,000

The present EBIT is ₹ 2,50,000, tax rate is 50%. Calculate financial leverage.

Solution:

	(₹)
EBIT (Earning Before Interest Tax)	2,50,000
(–) Interest (550000 x 8%)	44,000
PBT	2,06,000
(–) Tax @ 50%	1,03,000
PAT	**1,03,000**

$$\text{Financial Leverage} = \frac{\text{PBIT}}{\text{PBT}}$$

$$= \frac{2,50,000}{2,06,000}$$

$$= 1.21$$

Illustration 17. Y Ltd. has sales of ₹ 2,00,000. Variable cost is 50% of sales while the fixed operating cost amounts to ₹ 60,000. Interest on long-term loan amounted to ₹ 20,000.

You are requested to calculate the composite leverage and analyze the impact if sales increase by 10%.

Solution:

Particulars	(₹)	Sales ↑ 10%
Sales	2,00,000	2,20,000
(–) Variable cost	1,00,000	1,10,000
Contribution	1,00,000	1,10,000
(–) Fixed cost	60,000	60,000
PBIT	40,000	50,000
(–) Interest	20,000	20,000
PBT	20,000	30,000

$$\text{Composite Leverage (at present)} = \frac{\text{Contribution}}{\text{PBT}}$$

$$= \frac{1,00,000}{20,000}$$

$$= 5$$

$$\text{Composite Leverage (at present)} = \frac{\text{Contribution}}{\text{PBT}}$$

$$= \frac{1,10,000}{30,000}$$

$$= 3.67$$

Analysis

Increase in Sales reduces the combined risk and *vice versa.*

Illustration 18. The following information is available in respect of two firms, P Ltd. and Q Ltd.

	P Ltd. (₹)	Q Ltd. (₹)
Sales	500	1,000
(–) Variable cost	200	300
Contribution	300	700
(–) Fixed cost	150	400
EBIT	150	300
(–) Interest	50	100
Profit before tax	100	200

You are required to calculate different leverages for both the firms and also comment on their relative risk position.

Solution:

Particulars	P Ltd.	Q Ltd.
(1) Operating Leverage ratio = $\frac{\text{Contribution}}{\text{PBIT}}$	$\frac{300}{150}$ = 2	$\frac{700}{300}$ = 2.3
(2) Financial Leverage ratio = $\frac{\text{PBIT}}{\text{PBT}}$	= $\frac{150}{100}$ = 1.5	= $\frac{300}{200}$ = 1.5
(3) Combined Leverage ratio = Operating Leverage ratio x Financial Leverage ratio	= 2 × 1.5 = 3	= 2.3 × 1.5 = 3.45

Comment

(1) Operating Leverage: Q Ltd. has comparatively higher operating risk.

(2) Financial Leverage: The financial risk of both companies is same.

(3) Combined Leverage: The combine risk is higher for Q Ltd.

Illustration 19. A simplified Income Statement of Zenith Ltd. is given below. Calculate its degree of operating leverage, degree of financial leverage and degree of combined leverage.

Sales	(₹)
Variable cost	2,00,000
Fixed cost	75,000
EBIT	2,08,000
Interest	1,10,000
Taxes (30%)	29,400
Net Income	68,600

Solution:

Revenue statement for year .....

Particulars	(₹)
Sales	4,83,000
(–) Variable cost	2,00,000
Contribution	2,83,000
(–) Fixed cost	75,000
PBIT	2,08,000
(–) Interest	1,10,000
PBT	98,000
(–) Tax (30%)	29,400
PAT	68,600

$$\text{Operating Leverage Ratio} = \frac{\text{Contribution}}{\text{PBIT}}$$

$$= \frac{2,83,000}{2,08,000}$$

$$= 1.36$$

$$\text{Financial Leverage Ratio} = \frac{\text{PBIT}}{\text{PBT}}$$

$$= \frac{2,08,000}{98,000}$$

$$= 2.12$$

$$\text{Combined Leverage Ratio} = \frac{\text{Contribution}}{\text{PBT}}$$

$$= \frac{2,83,000}{98,000}$$

$$= 2.9$$

Illustration 20:

1. Find out operating leverage from the following data:

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

2. Find out financial leverage from the following data:

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

Solution:

(1)

Particulars	(₹)
Sales	50,000
(–) Variable cost (60%)	30,000
Contribution	20,000
(–) Fixed cost	12,000
PBIT	8,000

$$\text{Operating Leverage} = \frac{\text{Contribution}}{\text{PBIT}}$$

$$= \frac{20,000}{8,000}$$

$$= 2.5$$

(2)

Own Funds = Net worth = Equity = Shareholder fund = ₹ 25,00,000

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

$$\frac{3}{1} = \frac{\text{Debt.}}{25,00,000}$$

$\therefore$ Debt = ₹ 75,00,000

$\therefore$ Interest = ₹ 75,00,000 × 12%

= ₹ 9,00,000

Operating Profit	= EBIT	20,00,000
	(–) Interest	9,00,000
	EBT	11,00,000

$$\text{Financial Leverage Ratio} = \frac{\text{EBIT}}{\text{EBT}}$$

$$= \frac{20,00,000}{11,00,000}$$

$$= 1.8$$

Illustration 21. From the following information available for 4 firms, calculate the Earning before Interest and Tax (EBIT), Earnings per share (EPS), the operating leverage and the financial leverage.

Firms

	P	Q	R	S
Sales (in units)	20,000	25,000	30,000	40,000
Selling price per unit (₹)	15	20	25	30
Variable cost per unit (₹)	10	15	20	25
Fixed cost (₹)	30,000	40,000	50,000	60,000
Interest (₹)	15,000	25,000	35,000	40,000
Tax%	40	40	40	40
Number of Equity Shares	5,000	9,000	10,000	12,000

Solution:

Particulars	P	Q	R	S
Sales	3,00,000	5,00,000	7,50,000	12,00,000
(–) Variable cost	2,00,000	3,75,000	6,00,000	10,00,000
Contribution	1,00,000	1,25,000	1,50,000	2,00,000
(–) Fixed cost	30,000	40,000	50,000	60,000
PBIT	70,000	85,000	1,00,000	1,40,000
(–) Interest	15,000	25,000	35,000	40,000
PBT	55,000	60,000	65,000	1,00,000
(–) Tax (40%)	22,000	24,000	26,000	40,000
PAT	33,000	36,000	39,000	60,000
(–) Pref. dividend	–	–	–	–
Profit available to ESH a)…	33,000	36,000	39,000	60,000
No. of Equity Share b)…	5,000	9,000	10,000	12,000
EPS (a/b)	₹ 6.6	₹ 4	₹ 3.9	₹ 5
Operating Leverage = $\frac{\text{Contribution}}{\text{PBIT}}$	$\frac{1,00,000}{70,000}$ = 1.42	$\frac{1,25,000}{85,000}$ = 1.47	$\frac{1,50,000}{1,00,000}$ = 1.5	$\frac{2,00,000}{1,40,000}$ = 1.42
Financial Leverage = $\frac{\text{PBIT}}{\text{PBT}}$	$\frac{70,000}{55,000}$ = 1.27	$\frac{85,000}{60,000}$ = 1.41	$\frac{1,00,000}{65,000}$ = 1.54	$\frac{1,40,000}{1,00,000}$ = 1.4

Illustration 22. A firm has sales of ₹ 75,00,000; Variable Cost ₹ 42,00,000 and Fixed Cost of ₹ 6,00,000. It has Debt of ₹ 45,00,000 at 9% and Equity of ₹ 55,00,000.

(a) What is firm's ROI?

(b) Does it have a favorable Financial Leverage?

(c) If the firm belongs to an industry, whose asset turnover is 3, does it have high or low asset leverage?

(d) What are the Operating, Financial and Combined Leverage of the firm?

(e) If the sales drop to ₹ 50,00,000; what will be the new EBIT?

Solution:

Particulars	(₹)
Sales	75,00,000
(–) Variable cost (56%)	42,00,000
Contribution	33,00,000
(–) Fixed cost	6,00,000
PBIT	27,00,000
(–) Interest (9% x 45L)	4,05,000
PBT	22,95,000

(a) ROI $= \frac{\text{EBIT}}{\text{Cap. Emp.}} \times 100$

$= \frac{27,00,000}{55,00,000 + 45,00,000} \times 100$

$= \frac{27,00,000}{1,00,00,000} \times 100$

$= 27\%$

(b)Since ROI is greater than interest on borrowed fund, it can be said that the firm has favourable financial leverage.

(c) Asset Turnover Ratio $= \frac{\text{Sales}}{\text{Net Assets}}$

Or

$= \frac{\text{Sales}}{\text{Capital Employed}}$

$= \frac{75,00,000}{1,00,00,000}$

$= 0.75$

Comment: The firm has low asset leverage. It indicates inefficient utilization of asset/ excess capacity

(d) Operating Leverage Ratio $= \frac{\text{Contribution}}{\text{PBIT}}$

$= \frac{33,00,000}{27,00,000}$

$= 1.22$

Financial Leverage Ratio $= \frac{\text{PBIT}}{\text{PBT}}$

$= \frac{27,00,000}{22,95,000}$

$= 1.17$

Combined Leverage Ratio $= \frac{\text{Contribution}}{\text{PBT}}$

$= \frac{33,00,000}{22,95,000}$

$= 1.43$

(e)

	(₹)
Sales	50,00,000
(–) Variable cost (56%)	28,00,000
Contribution	22,00,000
(–) Fixed Cost	6,00,000
EBIT	16,00,000

Hence New EBIT will be ₹ **16,00,000.**

Illustration 23. The Selected financial data for A, B and C companies for the year ended 31st March, 2010 were as follows:

Particulars	A	B	C
Variable cost as a percentage of Sales	$66^2/_3$	75	50
Interest Expenses (₹)	200	300	1000
Degree of Operating Leverage	5	6	2
Degree of Financial Leverage	3	4	2
Income Tax Rate %	40	40	40

Prepare a income statement for each of the three companies. ***(MU, BMS, Nov. 2002)***

Solution:

Particulars	A	B	C
Sales	100% → 4,500	100 → 9,600	100 → 8,000
(–) Variable cost	66.66% → 3,000	75 → 7,200	50 → 4,000
Contribution	33.33% → 1,500	25 → 2,400	50 → 4,000
(–) Fixed cost	1,200	2,000	2,000
PBIT	300	400	2,000
(–) Interest	200	300	1,000
PBT	100	100	1,000
(–) Tax 40%	40	40	400
PAT	60	60	600

Working Notes:

(1) A Ltd.

$$\text{Degree of Financial Leverage} = \frac{\text{PBIT}}{\text{PBIT - I}}$$

$$3 = \frac{\text{PBIT}}{\text{PBIT - I}}$$

$$3 = \frac{\text{PBIT}}{\text{PBIT - 200}}$$

$$3\,(\text{PBIT} - 200) = \text{PBIT}$$

$$3\,\text{PBIT} - 600 = \text{PBIT}$$

$$3\,\text{PBIT} - \text{PBIT} = 600$$

$$2\,\text{PBIT} = 600$$

$$\text{PBIT} = 300$$

$$\text{Degree of Operating Leverage} = \frac{\text{Contribution}}{\text{PBIT}}$$

$$5 = \frac{\text{Contribution}}{300}$$

$$\text{Contribution} = 1{,}500$$

(2) B Ltd.

$$\text{Degree of Financial Leverage} = \frac{\text{PBIT}}{\text{PBIT - I}}$$

$$4 = \frac{\text{PBIT}}{\text{PBIT - I}}$$

$$4 = \frac{\text{PBIT}}{\text{PBIT} - 300}$$

4 PBIT – 1200 = PBIT
4 PBIT – PBIT = 12
3 PBIT = 1,200
PBIT = 400

$$\text{Degree of Operating Leverage} = \frac{\text{Contribution}}{\text{PBIT}}$$

$$6 = \frac{\text{Contribution}}{400}$$

Contribution = 2,400

(3) C Ltd. DFL

$$\text{Degree of Financial Leverage} = \frac{\text{PBIT}}{\text{PBIT} - \text{I}}$$

$$2 = \frac{\text{PBIT}}{\text{PBIT} - \text{I}}$$

$$2 = \frac{\text{PBIT}}{\text{PBIT - 100}}$$

2 (PBIT – 1,000) = PBIT
2 PBIT – 2,000 = PBIT
2 PBIT – PBIT = 2,000
PBIT = 2,000

$$\text{Degree of Operating Leverage} = \frac{\text{Contribution}}{\text{PBIT}}$$

$$2 = \frac{\text{Contribution}}{2{,}000}$$

Contribution = 4,000

Illustration 24. A firm has sales of ₹ 150 lakhs, variable cost of ₹ 84 lakhs and fixed cost of ₹ 12 lakhs. It has a debt of ₹ 90 lakhs at 9% and equity of ₹ 110 lakhs.

(a) What is the firm's ROI?

(b) Does it have favorable financial leverage?

(c) If the firm belongs to an industry whose asset turnover is 2, does it have high or low asset leverage?

(d) What is the operating, financial and combined leverage of the firm?

(e) If the sales drop to ₹ 125 lakhs, what will be the new EBIT?

(f) At what level the EBT of the firm will be equal to zero? ***(MU, BMS, Oct. 2003)***

Solution:

Particulars	(₹)
Sales	1,50,00,000
(–) Variable cost (56%)	84,00,000
Contribution	66,00,000
(–) Fixed cost	12,00,000
PBIT	54,00,000
(–) Interest	8,10,000
PBT	45,90,000

(a) ROI $= \frac{\text{EBIT}}{\text{Cap. Emp.}} \times 100$

$= \frac{54,00,000}{90,00,000 + 1,10,00,000} \times 100$

$= \frac{54,00,000}{2,00,00,000} \times 100$

$= 27\%$

(b) Since ROI is greater than interest on borrowed fund, it can be said that the firm has favourable financial leverages.

Asset turnover ratio $= \frac{\text{Sales}}{\text{Capital Employed}}$ **Or** $\frac{\text{Sales}}{\text{Net Assets}}$

$= \frac{1,50,00,000}{2,00,00,000}$

$= 0.75$

Comment: The firm has low asset leverage it indicates inefficient utilization of assets/ excess capital.

(d) Operating Leverage $= \frac{\text{Contribution}}{\text{EBIT}}$

$= \frac{66,00,000}{54,00,000}$

$= 1.22$

$$\text{Financial Leverage} = \frac{\text{EBIT}}{\text{EBT}}$$

$$= \frac{54,00,000}{45,90,000}$$

$$= 1.18$$

$$\text{Combined Leverage} = \frac{\text{Contribution}}{\text{PBT}}$$

$$= \frac{66,00,000}{45,90,000}$$

$$= ₹\ 1.44$$

	(₹)
(e) Sales	125
(–) Variable cost (56%)	70
Contribution	55
(–) Fixed Cost	12
EBIT	43

Hence New EBIT is ₹ 43 Lakhs

		(₹)
(f) Sales	100%	45,68,182
(–) Variable cost	56%	25,58,182
Contribution	44%	20,10,000
(–) Fixed Cost		12,00,000
PBIT		8,10,000
(–) Interest		8,10,000
PBT		0

Ans: At sales level of ₹ 45,68,182 EBT of firm will be Zero.

Illustration 25. Calculate operating leverage and financial leverage under situations A, B and C and Financial Plans I, II & III respectively from the following information relating to the operation and capital structure of Rani Ltd. Also find out combination of operating and financial leverages, which gives the highest value and least value. How are these calculation useful to finance manager.

Installed Capacity (No. of Units)			1,200
Actual Production & Sales (No. of Units)			800
Selling Price per Unit (₹)			15
Variable cost per Unit (₹)			10
Fixed cost – Situation A (₹)			1,000
Fixed cost – Situation B (₹)			2,000
Fixed cost – Situation C (₹)			3,000
Financial Plans	I	II	III
Equity (₹)	5,000	7,500	2,500
12% debt (₹)	5,000	2,500	7,500

(MU, BMS, Nov. 2007)

Solution:

Revenue statement for the year_____

Particulars	**(₹)**	**(₹)**	**(₹)**
Situation	**A**	**B**	**C**
Sales (800 x 15)	12,000	12,000	12,000
(–) Variable cost (800 x 10)	8,000	8,000	8,000
Contribution	4,000	4,000	4,000
(–) Fixed Cost	1,000	2,000	3,000
PBIT	3,000	2,000	1,000

Situation A.

Fixed cost ₹ 1,000

Financial Plan	**I**	**II**	**III**
PBIT	3,000	3,000	3,000
(–) Interest	600	300	900
PBT	2,400	2,700	2,100

$$\text{Operating Leverage} = \frac{\text{Contribution}}{\text{PBIT}}$$

$$= \frac{4,000}{3,000}$$

$$= 1.33$$

$$\text{Financial Leverage} = \frac{\text{PBIT}}{\text{PBT}}$$

$$\text{Plan [I]} = \frac{3,000}{2,400} = 1.25$$

$$\text{Plan [II]} = \frac{3,000}{2,700} = 1.11$$

$$\text{Plan [III]} = \frac{3,000}{2,100} = 1.43$$

Situation B.

Fixed Cost ₹ 2,000

Financial Plan	I	II	III
PBIT	2,000	2,000	2,000
(–) Interest	600	300	900
PBT	1,400	1,700	1,100

$$\text{Operating Leverage} = \frac{\text{Contribution}}{\text{PBIT}}$$

$$= \frac{4,000}{2,000}$$

$$= 2$$

$$\text{Financial Leverage} = \frac{\text{PBIT}}{\text{PBT}}$$

$$\text{Plan [I]} = \frac{2,000}{1,400} = 1.43$$

$$\text{Plan [II]} = \frac{2,000}{1,700} = 1.18$$

$$\text{Plan [III]} = \frac{2,000}{1,100} = 1.82$$

Situation C.

Fixed Cost ₹ 3,000

Financial Plan	I	II	III
PBIT	1,000	1,000	1,000
(–) Interest	600	300	900
PBT	400	700	100

$$\text{Operating Leverage} = \frac{\text{Contribution}}{\text{PBIT}}$$

$$= \frac{4,000}{1,000}$$

$$= 4$$

$$\text{Financial Leverage} = \frac{\text{PBIT}}{\text{PBT}}$$

$$\text{Plan [I]} = \frac{1,000}{400} = 2.5$$

$$\text{Plan [II]} = \frac{1,000}{700} = 1.43$$

$$\text{Plan [III]} = \frac{1,000}{100} = 10$$

Situation A

Combined Leverage = Operating Leverage × Financial Leverage

Plan [I] = 1.33 × 1.25 = 1.66

Plan [II] = 1.33 × 1.11 = 1.48

Plan [III] = 1.33 × 1.43 = 1.90

Situation B

Combined Leverage = Operating Leverage × Financial Leverage

Plan [I] = 2 × 1.43 = 2.86

Plan [II] = 2 × 1.18 = 2.36

Plan [III] = 2 × 1.82 = 3.64

Situation C

Combined Leverage = Operating Leverage × Financial Leverage

Plan [I] = 4 × 2.5 = 10

Plan [II] = 4 × 1.43 = 5.72

Plan [III] = 4 × 10 = 40

Conclusion: The highest combined leverage is under situation C, Plan III, i.e., 40 and least is under situation A, Plan II, i.e., 1.48.

Utility of calculation of finance manager: These calculation indicate how does variation in fixed cost and capital structure brings about change in risk and returns.

The finance manager should opt for the combination which will result into manageable risk and best possible returns.

Illustration 26. Given below is Balance Sheet of A Ltd.

Liabilities	(₹)	Assets	(₹)
ESC (₹ 10 / Share)	10,00,000	Sundry Assets	31,00,000
10% Preference Shares	10,00,000		
8% Debentures	11,00,000		
	31,00,000		**31,00,000**

(1) If ROI is 18% and Tax rate is 40%,

Calculate:-

(a) DFL (b) EPS (c) DOL (d) DCL

Company's assets turnover ratio is 0.6 and the P/V ratio is 33.33% (1/3)

Solution:

Working Notes:

(1) Capital Employed = 31 Lakhs.

ROI = 18%

$$ROI = \frac{EBIT}{Cap.\ Emp.} \times 100$$

$$\therefore \quad 18\% = \frac{EBIT}{31,00,000} \times 100$$

$$\therefore \quad \therefore EBIT = 5,58,000$$

Particulars	(₹)
Sales	18,60,000
(–) Variable cost	12,40,000
Contribution	6,20,000
(–) Fixed cost	62,000
EBIT	5,58,000
(–) Interest (debentures) (11,00,000 x 8%)	88,000
PBT	4,70,000
(–) Tax (40%)	1,88,000
PAT	2,82,000

(–) Preference dividend (1,00,000 x 10%)	1,00,000
Profit available to ESH (a)	1,82,000
No. of equity shares (b)	1,00,000
(ESC/FV) (10,00,000 /10)	

(b) ∴ EPS ÷ (a b) = 1.82

(a) DFL (EBIT / PBT)

$$= \frac{5,58,000}{4,70,000}$$

= 1.18

(c) DOL (C/EBIT)

$$= \frac{6,20,000}{4,70,000}$$

= 1.111

(d) DCL (C/PBT)

$$= \frac{6,20,000}{4,70,000}$$

= 1.319

(2) Assets turnover Ratio $= \frac{\text{Sales}}{\text{Net Assets}}$

∴ Sales = NA × ATR
= 31,00,000 × 0.6
= 18,60,000

(3) C = 33.33% of Sales. (PV ratio)

∴ C = 1/3 × 18,60,000
= 6,20,000

Illustration 27. Chittaranjan works is a rail coach manufacturing company and Infotech is a large size software development firm. Based on leverages you are required to advice an investor on the choice of investment in equity of these two firms:

Solution: Leverage is refered to higher profits because of fixed cost.

Operating Leverage: Operating Leverage refers to enhanced profits because of fixed operating expenses.

Formula: $DOL = \frac{\text{Contribution}}{\text{PBIT}} = \frac{\%\text{ Change in PBIT}}{\%\text{ Change in Sales}}$

Reason: Fixed operating expenses.

Effects: Higher gross profit, higher operating break-even point, higher business risks.

Financial leverage: Financial leverage refers to possible higher profits because of fixed financial expenses such as interest and preference dividend.

Formula: $DFL = \frac{\text{PBIT}}{\text{PBT}} = \frac{\%\text{ Change in PBT}}{\%\text{ Change in PBIT}}$

Reason: Interest, Preference Dividend

Effects: Higher net profit, higher financial break-even point, higher financial risk.

Combined Leverage: Combined Leverage refers to higher overall return because of operating fixed cost as well as financial fixed cost. (interest, preference dividend)

Formula: $DCL = \frac{\text{Contribution}}{\text{PBIT}} = \frac{\%\text{ Change in PBT}}{\%\text{ Change in Sales}}$

Reason: Interest Preference dividend, Operating fixed costs.

Effects: Higher net profit, high overall break-even point, higher overall risk.

Comparative Observations

	Chittaranjan Works	InfoTech
(i) Industry	Rail coach manufacturing.	Software.
(ii) Assets	Heavy assets such as huge land and building, Plant and machinery.	Lower level of asset investment Just an office as premises.
(iii) Manpower	Unskilled and skilled labour.	Professional expertise.
(iv) Capital Requirement	High.	Low.

Determinants of Leverages

	Chittaranjan Works	InfoTech
(i) Operating leverage (DOL)	Higher factory overheads such as power, depreciation and maintenance	Low factory overheads. High (fixed) salary bill of professionals.
(ii) Financial Leverage (DFL)	Capital intensive, likely to borrow more	Less Capital required, possibly lower borrowings.

Comments:

(i) Chittaranjan Works

(a) Higher DOL because of overheads.

(b) Higher DFL (high borrowings).

(c) Higher DCL.

(d) High overall and financial break-even point.

(e) Indicates highly leveraged, high risk and high return profile with average higher break-even point.

(ii) Infotech

(a) Higher DOL because of professional salaries.

(b) Lower DFL (low borrowings).

(c) Moderate DCL.

(d) Higher operating break-even point but moderate overall break-even point.

(e) Indicates moderately leveraged, moderate risk and moderate return profile with break-even point.

Conclusion:

(a) Chittaranjan works has high risk and high return profile. Business risk as well as financial risk is high. It is suitable for aggressive investor.

(b) Infotech has moderate risk and return profile. Business risk is high but financial risk is low. It is suitable for conservative investor.

(c) It may be noted that apart from leverages there are many other factors which influence investment decisions. In this case, rail coach manufacturing is a defensive industry that survives better in recession. Software firms give better returns in bullish markets.

Illustration 28. Interest ₹ 1,200/- DFL 3, DOL 2, PV Ratio 1/3, Interest Rate @ 10%,

Debt: Equity is 2 : 1 Tax @ 50%

(a) Prepare Income Statement

(b) Calculate RoI

(c) Is financial leverage favorable?

(d) Calculate Asset Leverage

(e) If Industry Asset leverage is 1.1, is this firm efficient?

Solution:

(a)

Income Statement

Sales	10,800
(–) VC	7,200
Contribution	3,600
(–) FC	1,800
PBIT	1,800
(–) Interest	1,200
PBT	600
(–) Tax 950%)	300
PAT	300

$$DFL = \frac{PBIT}{PBT} = \frac{PBIT}{PBIT - 1}$$

$$3 = \frac{PBIT}{PBIT - 1,200}$$

$$3\ PBIT - 3600 = PBIT$$

$$2\ PBIT = 3,600$$

$$PBIT = \frac{3,600}{2}$$

$$\therefore PBIT = 1,800$$

$$DOL = \frac{C}{PBIT}$$

$$2 = \frac{C}{1800}$$

$$\therefore C = 3,600$$

(b) 10% = 1,200

100% = >

Debt = 12,000

Equity = 6,000

Capital = 18,000

$$\text{ROI} = \frac{\text{PBIT}}{\text{Capital Employed}} \times 100$$

$$= \frac{1,800}{18,000} \times 100$$

$$= 10$$

(c) ROI = Interest on borrowing funds, hence financial leverage is neither favourable nor adverse.

$$\text{(d) Asset Leverage} = \frac{\text{Sales}}{\text{Capital}}$$

$$= \frac{10,800}{18,000}$$

$$= 0.6$$

(e) The firm is inefficient ∵ Asset leverage is less than standard.

Illustration 29. The following details for company A and B are given. You are required to compute the sales and then comment on the pforitability of both the companies.

Particulars	A	B
Operating Leverage	4	4.5
combined Leverage	8	11.15
9% Debentures	1,00,000	1,20,000
PV ratio	20%	25%
Tax rate	50%	50%

Solution:

A Ltd.

9% debentures = 1,00,000

∴ Interest = 1,00,000 × 9%

= 9,000

DCL = DOL × DFL

8 = 4 × DFL

∴ DFL = 2

$$\text{Also, DFL} = \frac{\text{PBIT}}{\text{PBIT} - 1}$$

$$2 = \frac{\text{PBIT}}{\text{PBIT} - 1}$$

2 PBIT – 18,000 = PBIT

PBIT = 18,000

$$DOL = \frac{C}{PBIT}$$

$$8 = \frac{72,000}{PBT}$$

PBT = 9,000

Contribution = Sales x PV ratio

$$C = \text{Sales} \times \frac{20}{100}$$

$$\therefore \text{Sales} = C \times \frac{100}{20}$$

$$= 72,000 \times \frac{100}{20}$$

= 3,60,000

Revenue Statement for year ending .....

Particulars	**(₹)**
Sales	3,60,000
(–) VC*	2,88,000
Contribution	72,000
(–) FC*	54,000
PBIT	18,000
(–) Interest	9,000
(–)	9,000
(–) Tax @ 50%	4,500
PAT	4,500

$$\therefore \text{Net profit margin} = \frac{NPAT}{Sales} \times 100$$

$$= \frac{4,500}{3,60,000} \times 100$$

= 1.25%

B Ltd.

Interest = 9% × 1,20,000

= 10.800

$$DFL = \frac{11.25}{4.5}$$

= 2.5

$$\therefore 2.5 = \frac{PBIT}{PBIT - 18,000}$$

2.5 PBIT = 27,000

PBIT = 18,000

$$DOL = \frac{C}{PBIT}$$

$$4.5 = \frac{C}{18,000}$$

C = 81,000

$$DCL = \frac{C}{PBT}$$

$$11.25 = \frac{81,000}{PBT}$$

∴ PBT = 7,200

$$\therefore \text{Sales} = \text{Contribution} \times \frac{100}{25}$$

$$= 81,000 \times \frac{100}{25}$$

= 3,24,000

Revenue Statement for year ending .....

Particulars	(₹)
Sales	3,24,000
(–) VC	2,43,000
Contribution	81,000
(–) FC	63,000
PBIT	18,000
(–) Interest	10,800
PBT	7,200
(–) Tax @ 50%	3,600
PAT	3,600

$$\text{Net Profit Margin} = \frac{3,600}{3,24,000} \times 100$$

$$= 1.11\%$$

Comment: A Ltd. has achieved higher profitability (NPM) at lowe risk.

Illustration 30. From the following particulars, prepare income statement of A Ltd. and B. Ltd.

	A Ltd	B Ltd.
Degree of Combined Leverage	6 times	15 times
Degree of Operating Leverage	3 times	5 times
Variable Cost as a % of Sales	40%	50%
Rate of Income Tax	35%	35%
Number of Equity Shares	1,00,000	1,00,000
Earning per share	₹ 1.30	₹ 0.65

(MU. TYBMS, Nov. 2011)

Solution:

A Ltd.

$$\text{EPS} = \frac{\text{NPAT} - \text{Pref. Dividend}}{\text{No. of Equity Shares}}$$

$$1.30 = \frac{\text{NMPAT} - 0}{1,00,000}$$

NPAT = 1,30,000

		%	₹
NPBT	→	100	?
(–) Tax	→	35	?
NPAT	→	65	1,30,000

$$\therefore \text{NPBT} = 1{,}30{,}000 \times \frac{100}{65}$$

$$= 2{,}00{,}000$$

$$\rightarrow \text{DCL} = \frac{C}{PBT}$$

$$6 = \frac{C}{2{,}00{,}000}$$

$$\therefore C = 12{,}00{,}000$$

$$\rightarrow \text{DOL} = \frac{C}{PBIT}$$

$$3 = \frac{12{,}00{,}000}{PBIT}$$

$$\therefore \text{PBIT} = 4{,}00{,}000$$

→ Sales	→	100	→	?
(-) VC		40	→	?
Contribution		60	→	12,00,000

$$\therefore \text{Sales} = 12{,}00{,}000 \times \frac{100}{60}$$

$$= 20{,}00{,}000$$

B Ltd.

$$\rightarrow \text{NPAT} = 0.65 \times 1{,}00{,}000$$

$$= 65{,}000$$

$$\rightarrow \text{NPBT} = 65{,}000 \times \frac{100}{65}$$

$$= 1{,}00{,}000$$

$$\rightarrow \text{DCL} = \frac{C}{PBT}$$

$$15 = \frac{C}{1,00,000}$$

$$\therefore C = 15,00,000$$

$$\rightarrow \text{DOL} = \frac{C}{PBT}$$

$$5 = \frac{15,00,000}{PBIT}$$

$$\therefore \text{PBIT} = 3,00,000$$

$$\rightarrow \text{Sales} = 15,00,000 \times \frac{100}{50}$$

$$= 30,00,000$$

Income Statement for year ending .....

Particulars		A Ltd.	b Ltd.
Sales		20,00,000	30,00,000
(–) VC		8,00,000	15,00,000
Contribution		12,00,000	15,00,000
(–) FC		8,00,000	12,00,000
PBIT		4,00,000	3,00,000
(–) Interest		2,00,000	2,00,000
NPBT		2,00,000	1,00,000
(-) Tax		70,000	35,000
NPAT	(a)	1,30,000	65,000
Verification			
No. of shares	(b)	1,00,000	1,00,000
∴ EPS	(a + b)	1.30	0.65

EXERCISE

Self-assessment Questions 1

1. _____arises due to the presence of fixed operating expenses in the firm's income flows.
2. EBIT is calculated as _____.
3. Higher operating risks can be taken when _____of companies are rising.
4. Dividend on _____is a fixed charge.
5. Financial leverage is also referred to as _____.
6. Financing mix decisions are _____ and have no impact on the _____ of the firm.
7. The value of a firm is dependent on its _____ and the _____.
8. _____ and _____ are two important sources of long-term sources of finance of a firm.
9. As the ratio of debt to equity increases, the _____ declines and _____ of firm increases.
10. As per the NOI approach the _____ remains constant for all degrees of leverage.
11. _____ is the process of buying a security at lower price in one market and selling it in another market at a higher price bringing about _____.

Answers to SAQs

Self-assessment Questions 1

1. Operating leverage
2. Q(S—V)—F
3. Income levels
4. Preference shares
5. Trading on Equity

1. Investment decisions, operating earnings
2. Expected future earnings, required rate of return
3. Equity; debt
4. WACC; market value
5. Overall capitalization rate
6. Arbitrage; equilibrium

Terminal Questions 1

1. What are the assumptions of MM approach?
2. The following data are available in respectof 2 firms. What is the average cost of capital?
3. Explain different Types of Leverage ratio?
4. Differences between Operatiing Leverage vs. Financial Leverage?

Terminal Questions 2

1. Mishra Ltd. provides the following information. What is the degree of operating leverage?

Output	1,00,000 Units
Fixed costs	₹15,000
Variable cost per unit	₹0.50
Interest on borrowed funds	₹ 10,000
Selling price per unit	₹ 1.50

2. X Ltd. provides the following information. What is the degree of financial leverage?

Output	25,000 units
Fixed costs	₹ 25,000
Variable cost	₹ 2.50 per unit
Interest on borrowed funds	₹ 15,000
Selling price	₹ 8 per unit

3. The following information is available in respect of 2 firms. Comment on their relative performance through leverage

	A Ltd. (₹ in lakhs)	**B Ltd. (₹ in lakhs)**
Sales	1,000	1,500
Variable cost	300	600
Fixed cost	250	400
EBIT	450	500
Interest	50	100

4. ABC Ltd. provides the following information. Calculate the DFL.

Output	2,00,000 units
Fixed costs	₹ 3,500
Variable cost	₹ 0.05 per unit
Interest on borrowed funds	Nil
Selling price per unit	0.20

5. What are the assumptions of MM approach?
6. The following data are available in respect of 2 firms. What is the average cost of capital?

	From A	From B
Net Operating Income	50,00,000	50,00,000
Interest on debt	Nil	50,000
Equity earnings	5,00,000	4,50,000
Cost of equity capital	15%	15%
Cost of debt	Nil	10%
Market value of equity shares	₹ 20,00,000	₹ 14,00,000
Market value of debt	Nil	4,00,000
Total value of firm	₹ 20,00,000	₹ 18,00,000

7. Two companies are identical in all respects in all aspects except the debt equity profile. Company X has 14% debentures worth ₹ 25,00,000 whereas company Y does not have any debt. Both companies earn 20% before interest and taxes on their total assets of ₹ 50,00,000. Assuming a tax rate of 40%, and cost of equity capital to be 22%, what is the value of the company X and Y using Net operating income approach?
8. The market value of debt and equity of a firm are ₹ 10 cr and ₹ 20 cr. respectively and their respective costs are 12% and 14%. The overall capital is 13.33%. Assuming the company has a 100% dividend pay-out ratio and there are no taxes, calculate the net operating income of the firm.
9. If a company has equity worth ₹ 300 lakhs, debentures worth ₹ 400 lakhs and term loan worth ₹ 50 lakhs, calculate the WACC.

Answers to Terminal Questions:

1. Hint DOL = $\frac{\{Q(S - V)\}}{\{Q(S - V) - F\}}$

2. Hint DFL = $\frac{EBIT}{\{EBIT - i - \{Dp/(1 - T)\}\}}$

3. Hint calculate DFL
4. WACC; market value.
5. Refer to 6.4.4
6. 3, 4. Ko = [B/(B+S)]Kd + [S/(B+S)]Ke
9. WACC = WeKe + WpKp +WrKr + WdKd + WtKt

   Hint: w_e =0.4; W_d = 0.533; w_t = 0.067.

r r r

Chapter 4

Types of Financing

Introduction

There are many (types) sources of finance, which would all provide the business with a quick source of money, which will have to be paid back. But the amount the company needs can limit them to a range of sources of finance and methods of repayment e.g. interest. The sources of finance can be split up into three types; long-term, medium-term and short-term. Long-term finance is mainly for companies who need a large sum of money, which would be difficult to be paid back, this would be used to provide start-up capital to finance the business for its whole lifespan, finance the purchase of assets with a longer life, such as buildings and provide expansion capital for large projects, such as building a new factory or taking over another business. The repayment as it is so much would be paid over a number of years rather than straight away. Medium-term finance is again for high sums of money needed but not as high as long-term, these usually would be used to finance the purchase of assets with a two to five year life, such as vehicles and computers, to replace an overdraft which is difficult to clear and is proving expensive and to finance a change in strategy, such as to switch marketing focus from Britain to the whole of Europe etc. But the repayment would be faster than long-term, such as in a couple of years etc. Short-term finance is when a company needs money quickly for immediate things, which are temporary; the repayments are much quicker than the others. They would be used to bridge temporary finance gaps, to get through periods when cash flow is poor and to cover temporary needs for extra funds due to unexpected problems or opportunities. There are possible sources of finance, which are available to a Limited company.

(a) Needs of Finance and Sources: Long-term, Medium-term, Short-term:

Financial needs of a business may be classified into two on the basis of the extent of permanence:

Fixed Capital: The funds required to purchase fixed or durable assets are known as fixed capital or long-term capital. The fixed or durable assets include land, buildings, machinery, equipment and furniture etc. The nature and size of the business generally determines the amount of fixed capital needed. For e.g., manufacturing activities require

large investments in plant, machinery, warehouses and others. While, trading concerns need relatively lesser investment in such assets. These assets continue to generate income and profits over an extended period of time. Also, funds which are once invested in fixed assets cannot be withdrawn and put to some other use.

Working Capital: Money invested in short-term assets or current assets is known as working capital. It includes purchase of raw materials, payment of wages and salaries, rent, fuel, electricity and water, repairs and maintenance of machinery, advertising, etc. Besides, sale of goods on credit leads to the holding of debtors balance and bills receivable, which may also be regarded as current assets. The requirement of finance for all these purposes arises at short intervals. Working capital is also known as Circulating capital or Revolving capital because funds invested in such assets are continuously recovered through realisation of cash, and again reinvested in current assets. The amount of working capital required depends mainly on the nature of the business, the time required for completing the manufacturing process, and the terms on which materials are purchased and goods sold. For e.g. trading companies require more working capital than manufacturing companies.

On the basis of period of use, the financial needs of the business may be classified into:

Short-term Finance

Short-term finance is required for a shorter period, i.e., less than a year. It involves financing the current assets and meeting day to day expenses.

Need of Short-term Finance

After establishment of a business, funds are required to meet its day to day expenses. For example raw materials must be purchased at regular intervals, workers must be paid wages regularly, water and power charges have to be paid regularly. Thus, there is a continuous necessity of liquid cash to be available for meeting these expenses. For financing such requirements short-term funds are needed. The availability of short-term funds is essential. Inadequacy of short-term funds may even lead to closure of business.

Short-term finance serves following purposes

1. It facilitates the smooth running of business operations by meeting day to day financial requirements.
2. It enables firms to hold stock of raw materials and finished product.
3. With the availability of short-term finance, goods can be sold on credit. Sales are for a certain period and collection of money from debtors takes time. During this time, gap in production continues and money will be needed to finance various operations of the business.
4. Short-term finance becomes more essential when it is necessary to increase the volume of production at a short notice.
5. Short-term funds are also required to allow flow of cash during the operating cycle. Operating cycle refers to the time gap between commencement of production and realisation of sales.

Sources of Short-term Finance

There are a number of sources of short-term finance which are listed below:

1. Trade credit
2. Bank credit
   - Loans and advances
   - Cash credit
   - Overdraft
   - Discounting of bills
3. Customers' advances
4. Instalment credit
5. Loans from cooperatives

1. Trade Credit: Usually in business dealing supplier give a grace period to their customers to pay for the purchases. This can range from 1 week to 90 days depending upon the type of business and industry. Trade credit refers to credit granted to manufactures and traders by the suppliers of raw material, finished goods, components, etc. Usually business enterprises buy supplies on a 30 to 90 days credit. This means that the goods are delivered but payments are not made until the expiry of period of credit. This type of credit does not make the funds available in cash but it facilitates purchases without making immediate payment. This is quite a popular source of finance. By delaying the payment of bills for goods or services received, a business is, in effect, obtaining finance which can be used for more important expenditures.

2. Money Market: It deals with Financing for short-term period of one year or less than one year. The instruments that come under this category are — bank credit, treasury bills, bills of exchange, certificate of deposits, commercial papers etc.

Bank Credit: Commercial banks grant short-term finance to business firms which is known as bank credit. When bank credit is granted, the borrower gets a right to draw the amount of credit at one time or in instalments as and when needed. Bank credit may be granted by way of loans, cash credit, overdraft and discounted bills.

Lending to smaller companies will be at a margin above the bank's base rate and at either a variable or fixed rate of interest. Lending on overdraft is always at a variable rate. A loan at a variable rate of interest is sometimes referred to as a *floating rate loan.* Longer-term bank loans will sometimes be available, usually for the purchase of property, where the loan takes the form of a mortgage. When a banker is asked by a business customer for a loan or overdraft facility, he will consider several factors, known commonly by the mnemonic **PARTS.**

- **P**urpose
- **A**mount
- **R**epayment

— **T**erm

— **S**ecurity

P	The purpose of the loan. A loan request will be refused if the purpose of the loan is not acceptable to the bank.
A	The amount of the loan. The customer must state exactly how much he wants to borrow. The banker must verify, as far as he is able to do so, that the amount required to make the proposed investment has been estimated correctly.
R	How will the loan be repaid? Will the customer be able to obtain sufficient income to make the necessary repayments?
T	What would be the duration of the loan? Traditionally, banks have offered short-term loans and overdrafts, although medium-term loans are now quite common.
S	Does the loan require security? If so, is the proposed security adequate?

(i) Loans: When a certain amount is advanced by a bank repayable after a specified period, it is known as bank loan. Such advance is credited to a separate loan account and the borrower has to pay interest on the whole amount of loan irrespective of the amount of loan actually drawn. Usually loans are granted against security of assets.

(ii) Cash Credit: It is an arrangement whereby banks allow the borrower to withdraw money upto a specified limit. This limit is known as cash credit limit. Initially this limit is granted for one year. This limit can be extended after review for another year. However, if the borrower still desires to continue the limit, it must be renewed after three years. Rate of interest varies depending upon the amount of limit. Banks ask for collateral security for the grant of cash credit. In this arrangement, the borrower can draw, repay and again draw the amount within the sanctioned limit. Interest is charged only on the amount actually withdrawn and not on the amount of entire limit.

(iii) Overdraft: When a bank allows its depositors or account holders to withdraw money in excess of the balance in his account up to a specified limit, it is known as overdraft facility. This limit is granted purely on the basis of credit-worthiness of the borrower.

(iv) Discounting of Bill: Banks also advance money by discounting bills of exchange, promissory notes and hundies. When these documents are presented before the bank for discounting, banks credit the amount to cutomer's account after deducting discount. The amount of discount is equal to the amount of interest for the period of bill.

(v) Commercial Paper: This is an unsecured promissory note with a fixed maturity of 1 to 364 days in the global money market. It is issued by large corporations to get financing to meet short-term debt obligations. It is only backed by an issuing bank or corporation's promise to pay the face amount on the maturity date specified on the note. Since it is not backed by collateral, only firms with excellent credit ratings from a recognized rating agency will be able to sell their commercial paper at a reasonable price. Asset-backed commercial paper (ABCP) is a form of commercial paper that is collateralized by other financial assets. ABCP is

typically a short-term instrument that matures between 1 and 180 days from issuance and is typically issued by a bank or other financial institution.

(vi) Letter of Credit: This is a document that a financial institution or similar party issues to a seller of goods or services which provides that the issuer will pay the seller for goods or services the seller delivers to a third-party buyer. The issuer then seeks reimbursement from the buyer or from the buyer's bank. The document serves essentially as a guarantee to the seller that it will be paid by the issuer of the letter of credit, regardless of whether the buyer ultimately fails to pay.

3. Customers' Advances: Sometimes businessmen insist on their customers to make some advance payment. It is generally asked when the value of order is quite large or things ordered are very costly. Customers' advance represents a part of the payment towards price on the product (s) which will be delivered at a later date. Customers generally agree to make advances when such goods are not easily available in the market or there is an urgent need of goods. A firm can meet its short-term requirements with the help of customers' advances.

4. Instalment Credit: Instalment credit is nowadays a popular source of finance for consumer goods like television, refrigerators as well as for industrial goods. You might be aware of this system. Only a small amount of money is paid at the time of delivery of such articles. The balance is paid in a number of instalments. The supplier charges interest for extending credit. The amount of interest is included while deciding on the amount of instalment. Another comparable system is the hire purchase system under which the purchaser becomes owner of the goods after the payment of last instalment. Sometimes commercial banks also grant instalment credit if they have suitable arrangements with the suppliers.

5. Loans from Cooperative Banks: Cooperative banks are a good source to procure short-term finance. Such banks have been established at local, district and state levels. District Cooperative Banks are the federation of primary credit societies. The State Cooperative Bank finances and controls the District Cooperative Banks in the state. They are also governed by Reserve Bank of India regulations. Some of these banks like the Vaish Cooperative Bank was initially established as a cooperative society and later converted into a bank. These banks grant loans for personal as well as business purposes. Membership is the primary condition for securing loan. The functions of these banks are largely comparable to the functions of commercial banks.

6. Factoring of Debts: It involves the business selling its bills receivable to a debt factoring company at a discounted price. In this way the business get access to instant cash.

Merits and Demerits of Short-term Finance

Short-term loans help business concerns to meet their temporary requirements of money. They do not create a heavy burden of interest on the organisation. But sometimes organisations keep away from such loans because of uncertainty and other reasons. Let us examine the merits and demerits of short-term finance.

Merits of short-term finance

(a) Economical: Finance for short-term purposes can be arranged at a short notice and does not involve any cost of raising. The amount of interest payable is also affordable. It is, thus, relatively more economical to raise short-term finance.

(b) Flexibility: Loans to meet short-term financial need can be raised as and when required. These can be paid back if not required. This provides flexibility.

(c) No interference in management: The lenders of short-term finance cannot interfere with the management of the borrowing concern. The management retain their freedom in decision making.

(d) May also serve long-term purposes: Generally business firms keep on renewing short-term credit, e.g., cash credit is granted for one year but it can be extended up to 3 years with annual review.

After three years it can be renewed. Thus, sources of short-term finance may sometimes provide funds for long-term purposes.

Demerits of short-term finance

Short-term finance suffers from a few demerits which are listed below:

(a) Fixed burden: Like all borrowings interest has to be paid on short-term loans irrespective of profit or loss earned by the organisation. That is why business firms use short-term finance only for temporary purposes.

(b) Charge on assets: Generally short-term finance is raised on the basis of security of moveable assets. In such a case the borrowing concern cannot raise further loans against the security of these assets nor can these be sold until the loan is cleared (repaid).

(c) Difficulty of raising finance: When business firms suffer intermittent losses of huge amount or market demand is declining or industry is in recession, it loses its creditworthiness. In such circumstances they find it difficult to borrow from banks or other sources of short-term finance.

(d) Uncertainty: In cases of crisis business firms always face the uncertainty of securing funds from sources of short-term finance. If the amount of finance required is large, it is also more uncertain to get the finance.

(e) Legal formalities: Sometimes certain legal formalities are to be complied with for raising finance from short-term sources. If shares are to be deposited as security, then transfer deed must be prepared.

Medium-term finance: Medium-term Finance are loans for a period of from three to five years. The rate of interest charged on medium-term bank lending to large companies will be a set margin, with the size of the margin depending on the credit standing and riskiness of the borrower. A loan may have a fixed rate of interest or a variable interest rate, so that the rate of interest charged will be adjusted every three, six, nine or twelve months in line with recent movements in the Base Lending Rate. It involves financing certain activities like

renovation of buildings, modernisation of machinery, heavy expenditure on advertising, etc. Medium-term and long-term financing are also customarily referred to as term financing. Various credit instruments can fall under these categories. For instance, there are short term loans, medium-term loans and long-term loans. Bonds, lease financing, and other securities are usually designed to be medium-term and long-term financing instruments.

Bank term loan: This is possibly the simplest form of loans available to businesses. The average bank manager dealing with a medium sized firm and responsible to head office for the performance of the branch uses a set of well-defined criteria when making a loan. A bank loan is for a fixed amount at a fixed rate of interest. There is likely to be a demand for regular payments.

The advantages of a bank term loan is that financial planning is made easier as repayments are made in regular instalments and the interest rate are often fixed, but the disadvantages are the smaller the business the higher rates paid due to presenting a higher risk of things going wrong.

Long-term Finance: Long-term sources or funds are required to create production facilities through purchases of fixed assets such as plant, machinery, land, building, furniture, etc. Investments in these assets represent that part of firm's capital which is blocked on a permanent or fixed basis and is called fixed capital. Long-term Finance is required for a longer period, i.e., five years or more. The fixed assets as well as the permanent part of the working capital is financed by it.

The important sources of long-term finance are:-

The capital markets:

(i) New share issues, for example, by companies acquiring a stock market listing for the first time

(ii) Rights issues

Issue of debentures

Loans from financial institutions

Reinvestment of profit

- Loan stock
- Retained earnings
- Bank borrowing
- Government sources
- Business expansion scheme funds
- Venture capital
- Franchising

Ownership Capital: It is the amount of capital invested in a business by its owners. It is on the basis of the amount invested that the owners become entitled to the profits of the

business. Under sole proprietorship, the individual owner normally invests capital from his own savings. In partnership, each partner contributes capital as mutually agreed among partners. While companies raise capital by issuing shares. The investors who contribute towards the share capital of a company become its owners by virtue of their shareholdings. The rate of return on owners investment depends on the level of profits earned and are entitled to receive dividend out of these profits. Ownership capital is generally used as permanent capital or long-term capital.

Borrowed Capital: The financial requirements of the business are often met by raising loans. Borrowed money involves a fixed obligation to pay interest and repay the principal amount as and when due. In a sole proprietary business the proprietor can borrow money on his personal security or on the security of his existing assets. A partnership firm can raise loans on the personal security of the individual partners. Companies can also borrow either by issuing debentures or bonds, or raise direct loans. Money may be borrowed for short-term and long-term, i.e., to finance fixed assets as well as current assets.

Issue of Shares: This is the issuing of shares of the business to other investors who want to buy into the company.

The main advantage of issuing shares is that the shareholders have limited liability if the business fails. Personal possessions are not at risk and their liability is limited to the actual capital invested. Also the capital is raised by issuing shares (which are a proportion of what the company is worth) to investors, who are encouraged to buy by the promise of receiving dividends or profits on their shares. Also shares can be sold as preference shares which offer a fixed return as profits change from year to year, according to how well the company has done.

The disadvantages of selling shares are the administrative costs of issuing shares are high. Also it is difficult to estimate the market price of shares, though this problem can be avoided if tender issues them, where investors state how much they are willing to pay for them. Also the price of the shares can go up or down and shareholders may have to sell at a lower price than they bought it. Also the shares of a limited company will have to be sold privately, which costs money and investors would might not want to invest due to the lack of hassle from buying into a Plc.

Reinvested Profits: This is the money that the business makes being re-invested into the business to aid its plans.

The advantage of this is capital can be raised by the company reinvesting or ploughing back the profits made at the end of the year, after expenses and dividends to shareholders have been paid.

The disadvantage of this is profits may be scarce or non-existent, especially in times of recession.

Capital Market: It deals with financial securities having a long maturity period of more than one year. Instruments that come under this category are debentures, equity and preference stock, etc.

Ordinary (equity) shares: Ordinary shares are issued to the owners of a company. They have a nominal or 'face' value, typically of $1 or 50 cents. The market value of a quoted company's shares bears no relationship to their nominal value, except that when ordinary shares are issued for cash, the issue price must be equal to or be more than the nominal value of the shares.

Deferred ordinary shares are a form of ordinary shares, which are entitled to a dividend only after a certain date or if profits rise above a certain amount. Voting rights might also differ from those attached to other ordinary shares.

Ordinary shareholders put funds into their company:

(a) by paying for a new issue of shares

(b) through retained profits.

Simply retaining profits, instead of paying them out in the form of dividends, offers an important, simple low-cost source of finance, although this method may not provide enough funds, for example, if the firm is seeking to grow.

A new issue of shares might be made in a variety of different circumstances:

(a) The company might want to raise more cash. If it issues ordinary shares for cash, should the shares be issued *pro rata* to existing shareholders, so that control or ownership of the company is not affected? If, for example, a company with 200,000 ordinary shares in issue decides to issue 50,000 new shares to raise cash, should it offer the new shares to existing shareholders, or should it sell them to new shareholders instead?

   (i) If a company sells the new shares to existing shareholders in proportion to their existing shareholding in the company, we have a *rights issue.* In the example above, the 50,000 shares would be issued as a one-in-four rights issue, by offering shareholders one new share for every four shares they currently hold.

   (ii) If the number of new shares being issued is small compared to the number of shares already in issue, it might be decided instead to sell them to new shareholders, since ownership of the company would only be minimally affected.

(b) The company might want to issue shares partly to raise cash, but more importantly to float its shares on a stock exchange.

(c) The company might issue new shares to the shareholders of another company, in order to take it over.

New shares issues: A company seeking to obtain additional equity funds may be:

(a) an unquoted company wishing to obtain a Stock Exchange quotation

(b) an unquoted company wishing to issue new shares, but without obtaining a Stock Exchange quotation

(c) a company which is already listed on the Stock Exchange wishing to issue additional new shares.

The methods by which an unquoted company can obtain a quotation on the stock market are:

(a) an offer for sale

(b) a prospectus issue

(c) a placing

(d) an introduction.

Offers for sale: An offer for sale is a means of selling the shares of a company to the public.

(a) An unquoted company may issue shares, and then sell them on the Stock Exchange, to raise cash for the company. All the shares in the company, not just the new ones, would then become marketable.

(b) Shareholders in an unquoted company may sell some of their existing shares to the general public. When this occurs, the company is not raising any new funds, but just providing a wider market for its existing shares (all of which would become marketable), and giving existing shareholders the chance to cash in some or all of their investment in their company.

When companies 'go public' for the first time, a 'large' issue will probably take the form of an offer for sale. A smaller issue is more likely to be a placing, since the amount to be raised can be obtained more cheaply if the issuing house or other sponsoring firm approaches selected institutional investors privately.

Rights issues: A rights issue provides a way of raising new share capital by means of an offer to existing shareholders, inviting them to subscribe cash for new shares in proportion to their existing holdings.

For example, a rights issue on a one-for-four basis at ₹ 280 per share would mean that a company is inviting its existing shareholders to subscribe for one new share for every four shares they hold, at a price of ₹ 280 per new share.

A company making a rights issue must set a price which is low enough to secure the acceptance of shareholders, who are being asked to provide extra funds, but not too low, so as to avoid excessive dilution of the earnings per share.

Preference shares: Preference shares have a fixed percentage dividend before any dividend is paid to the ordinary shareholders. As with ordinary shares a preference dividend can only be paid if sufficient distributable profits are available, although with 'cumulative' preference shares the right to an unpaid dividend is carried forward to later years. The arrears of dividend on cumulative preference shares must be paid before any dividend is paid to the ordinary shareholders.

From the company's point of view, preference shares are advantageous in that:

- Dividends do not have to be paid in a year in which profits are poor, while this is not the case with interest payments on long-term debt (loans or debentures).

- Since they do not carry voting rights, preference shares avoid diluting the control of existing shareholders while an issue of equity shares would not.
- Unless they are redeemable, issuing preference shares will lower the company's gearing. Redeemable preference shares are normally treated as debt when gearing is calculated.
- The issue of preference shares does not restrict the company's borrowing power, at least in the sense that preference share capital is not secured against assets in the business.
- The non-payment of dividend does not give the preference shareholders the right to appoint a receiver, a right which is normally given to debenture holders.

However, dividend payments on preference shares are not tax deductible in the way that interest payments on debt are. Furthermore, for preference shares to be attractive to investors, the level of payment needs to be higher than for interest on debt to compensate for the additional risks.

For the investor, preference shares are less attractive than loan stock because:

- they cannot be secured on the company's assets
- the dividend yield traditionally offered on preference dividends has been much too low to provide an attractive investment as compared with the interest yields on loan stock in view of the additional risk involved.

Loan stock: Loan stock is long-term debt capital raised by a company for which interest is paid, usually half yearly and at a fixed rate. Holders of loan stock are therefore long-term creditors of the company.

Loan stock has a nominal value, which is the debt owed by the company, and interest is paid at a stated "coupon yield" on this amount. For example, if a company issues 10% loan stock the coupon yield will be 10% of the nominal value of the stock, so that ₹ 100 of stock will receive ₹ 10 interest each year. The rate quoted is the gross rate, before tax.

Debentures are a form of loan stock, legally defined as the written acknowledgement of a debt incurred by a company, normally containing provisions about the payment of interest and the eventual repayment of capital.

Debenture Loans: A debenture is a long-term loan, which does not have to be repaid until an agreed date. Debenture holders are entitled to a fixed rate of the return year and have priority over all the shareholders.

The advantage of this is that individuals can supply capital to a company in the form of a long-term loan called debentures, which have to be repaid on an agreed date. These payments take priority over payments to all other shareholders.

The disadvantage is that the company has to offer some security for the loan, which can be sold if the company cannot meet the payments. In the case of a fixed debenture this is a specific asset such as a building or land.

Debentures with a floating rate of interest

These are debentures for which the coupon rate of interest can be changed by the issuer, in accordance with changes in market rates of interest. They may be attractive to both lenders and borrowers when interest rates are volatile.

Security: Loan stock and debentures will often be *secured.* Security may take the form of either a *fixed charge* or a *floating charge.*

(a) Fixed charge: Security would be related to a specific asset or group of assets, typically land and buildings. The company would be unable to dispose of the asset without providing a substitute asset for security, or without the lender's consent.

(b) Floating charge: With a floating charge on certain assets of the company (for example, stocks and debtors), the lender's security in the event of a default payment is whatever assets of the appropriate class the company then owns (provided that another lender does not have a prior charge on the assets). The company would be able, however, to dispose of its assets as it chose until a default took place. In the event of a default, the lender would probably appoint a receiver to run the company rather than lay claim to a particular asset.

The redemption of loan stock: Loan stock and debentures are usually redeemable. They are issued for a term of ten years or more, and perhaps 25 to 30 years. At the end of this period, they will "mature" and become redeemable (at par or possibly at a value above par).

Most redeemable stocks have an earliest and latest redemption date. For example, 18% Debenture Stock 2007/09 is redeemable, at any time between the earliest specified date (in 2007) and the latest date (in 2009). The issuing company can choose the date. The decision by a company when to redeem a debt will depend on:

(a) how much cash is available to the company to repay the debt

(b) the nominal rate of interest on the debt. If the debentures pay 18% nominal interest and the current rate of interest is lower, say 10%, the company may try to raise a new loan at 10% to redeem the debt which costs 18%. On the other hand, if current interest rates are 20%, the company is unlikely to redeem the debt until the latest date possible, because the debentures would be a cheap source of funds.

There is no guarantee that a company will be able to raise a new loan to pay-off a maturing debt, and one item to look for in a company's balance sheet is the redemption date of current loans, to establish how much new finance is likely to be needed by the company, and when.

Mortgages are a specific type of secured loan. Companies place the title deeds of freehold or long leasehold property as security with an insurance company or mortgage broker and receive cash on loan, usually repayable over a specified period. Most organisations owning property which is unencumbered by any charge should be able to obtain a mortgage up to two thirds of the value of the property.

As far as companies are concerned, debt capital is a potentially attractive source of finance because interest charges reduce the profits chargeable to corporation tax.

Mortgage Loans: This is a loan where the lender insists on some asset of the business being tied to the repayment of the loan. In the event of bankruptcy or liquidation that lender will then have priority on the money from the sale of that asset for the repayment of the loan. The asset is always land or property.

The advantage of this is capital is often supplied by pension or insurance funds for a loan over 25-30 years for buildings or land, with the asset as security.

The disadvantage of this the loans are usually only given when large sums are required.

Retained earnings: For any company, the amount of earnings retained within the business has a direct impact on the amount of dividends. Profit re-invested as retained earnings is profit that could have been paid as a dividend. The major reasons for using retained earnings to finance new investments, rather than to pay higher dividends and then raise new equity for the new investments, are as follows:

(a) The management of many companies believes that retained earnings are funds which do not cost anything, although this is not true. However, it is true that the use of retained earnings as a source of funds does not lead to a payment of cash.

(b) The dividend policy of the company is in practice determined by the directors. From their standpoint, retained earnings are an attractive source of finance because investment projects can be undertaken without involving either the shareholders or any outsiders.

(c) The use of retained earnings as opposed to new shares or debentures avoids issue costs.

(d) The use of retained earnings avoids the possibility of a change in control resulting from an issue of new shares.

Another factor that may be of importance is the financial and taxation position of the company's shareholders. If, for example, because of tax considerations, they would rather make a capital profit (which will only be taxed when shares are sold) than receive current income, then finance through retained earnings would be preferred to other methods.

A company must restrict its self-financing through retained profits because shareholders should be paid a reasonable dividend, in line with realistic expectations, even if the directors would rather keep the funds for re-investing. At the same time, a company that is looking for extra funds will not be expected by investors (such as banks) to pay generous dividends, nor over-generous salaries to owner-directors.

Leasing: Leasing, in general, allows a company use of an asset without having to pay the full amount upfront. A leasing agreement is drawn up with the lessee agreeing to pay periodic rental payments in exchange for the use of a capital asset. It is in effect a rental agreement, apart from a clause, which allows the lessee to own, or to buy over the machine at a reduced rate, at the end of the lease agreement. A lease is an agreement between two parties, the "lessor" and the "lessee". The lessor owns a capital asset, but allows the lessee to use it. The lessee makes payments under the terms of the lease to the lessor, for a specified period of time. Leasing is, therefore, a form of rental. Leased assets have usually been plant and

machinery, cars and commercial vehicles, but might also be computers and office equipment. There are two basic forms of lease: "operating leases" and "finance leases".

Operating leases: Operating leases are rental agreements between the lessor and the lessee whereby:

(a) the lessor supplies the equipment to the lessee

(b) the lessor is responsible for servicing and maintaining the leased equipment

(c) the period of the lease is fairly short, less than the economic life of the asset, so that at the end of the lease agreement, the lessor can either

  (i) lease the equipment to someone else, and obtain a good rent for it, or

  (ii) sell the equipment secondhand.

Finance leases: Finance leases are lease agreements between the user of the leased asset (the lessee) and a provider of finance (the lessor) for most, or all, of the asset's expected useful life.

Suppose that a company decides to obtain a company car and finance the acquisition by means of a finance lease. A car dealer will supply the car. A finance house will agree to act as lessor in a finance leasing arrangement, and so will purchase the car from the dealer and lease it to the company. The company will take possession of the car from the car dealer, and make regular payments (monthly, quarterly, six monthly or annually) to the finance house under the terms of the lease.

Other important characteristics of a finance lease:

(a) The lessee is responsible for the upkeep, servicing and maintenance of the asset. The lessor is not involved in this at all.

(b) The lease has a primary period, which covers all or most of the economic life of the asset. At the end of the lease, the lessor would not be able to lease the asset to someone else, as the asset would be worn out. The lessor must, therefore, ensure that the lease payments during the primary period pay for the full cost of the asset as well as providing the lessor with a suitable return on his investment.

(c) It is usual at the end of the primary lease period to allow the lessee to continue to lease the asset for an indefinite secondary period, in return for a very low nominal rent. Alternatively, the lessee might be allowed to sell the asset on the lessor's behalf (since the lessor is the owner) and to keep most of the sale proceeds, paying only a small percentage (perhaps 10%) to the lessor.

Why might leasing be popular?

The attractions of leases to the supplier of the equipment, the lessee and the lessor are as follows:

- The supplier of the equipment is paid in full at the beginning. The equipment is sold to the lessor, and apart from obligations under guarantees or warranties, the supplier has no further financial concern about the asset.

- The lessor invests finance by purchasing assets from suppliers and makes a return out of the lease payments from the lessee. Provided that a lessor can find lessees willing to pay the amounts he wants to make his return, the lessor can make good profits. He will also get capital allowances on his purchase of the equipment.
- Leasing might be attractive to the lessee:
  (i) if the lessee does not have enough cash to pay for the asset, and would have difficulty obtaining a bank loan to buy it, and so has to rent it in one way or another if he is to have the use of it at all; or
  (ii) if finance leasing is cheaper than a bank loan. The cost of payments under a loan might exceed the cost of a lease.

Operating leases have further advantages:

- The leased equipment does not need to be shown in the lessee's published balance sheet, and so the lessee's balance sheet shows no increase in its gearing ratio.
- The equipment is leased for a shorter period than its expected useful life. In the case of high-technology equipment, if the equipment becomes out of date before the end of its expected life, the lessee does not have to keep on using it, and it is the lessor who must bear the risk of having to sell obsolete equipment secondhand.

The lessee will be able to deduct the lease payments in computing his taxable profits.

Hire purchase: Hire purchase is a form of instalment credit. Hire purchase is similar to leasing, with the exception that ownership of the goods passes to the hire purchase customer on payment of the final credit instalment, whereas a lessee never becomes the owner of the goods.

Hire purchase agreements usually involve a finance house.

(i) The supplier sells the goods to the finance house.
(ii) The supplier delivers the goods to the customer who will eventually purchase them.
(iii) The hire purchase arrangement exists between the finance house and the customer.

The finance house will always insist that the hirer should pay a deposit towards the purchase price. The size of the deposit will depend on the finance company's policy and its assessment of the hirer. This is in contrast to a finance lease, where the lessee might not be required to make any large initial payment.

An industrial or commercial business can use hire purchase as a source of finance. With industrial hire purchase, a business customer obtains hire purchase finance from a finance house in order to purchase the fixed asset. Goods bought by businesses on hire purchase include company vehicles, plant and machinery, office equipment and farming machinery.

Government assistance: The government provides finance to companies in cash grants and other forms of direct assistance, as part of its policy of helping to develop the national economy, especially in high technology industries and in areas of high unemployment. For example, the Indigenous Business Development Corporation of Zimbabwe (IBDC) was set up by the government to assist small indigenous businesses in that country.

Venture capital: Venture capital is money put into an enterprise which may all be lost if the enterprise fails. A businessman starting up a new business will invest venture capital of his own, but he will probably need extra funding from a source other than his own pocket. However, the term 'venture capital' is more specifically associated with putting money, usually in return for an equity stake, into a new business, a management buy-out or a major expansion scheme.

The institution that puts in the money recognises the gamble inherent in the funding. There is a serious risk of losing the entire investment, and it might take a long time before any profits and returns materialise. But there is also the prospect of very high profits and a substantial return on the investment. A venture capitalist will require a high expected rate of return on investments, to compensate for the high risk.

A venture capital organisation will not want to retain its investment in a business indefinitely, and when it considers putting money into a business venture, it will also consider its "exit", that is, how it will be able to pull out of the business eventually (after five to seven years, say) and realise its profits. Examples of venture capital organisations are: Merchant Bank of Central Africa Ltd and Anglo American Corporation Services Ltd.

When a company's directors look for help from a venture capital institution, they must recognise that:

- the institution will want an equity stake in the company
- it will need convincing that the company can be successful
- it may want to have a representative appointed to the company's board, to look after its interests.

The directors of the company must then contact venture capital organisations, to try and find one or more which would be willing to offer finance. A venture capital organisation will only give funds to a company that it believes can succeed, and before it will make any definite offer, it will want from the company management:

(a) a business plan

(b) details of how much finance is needed and how it will be used

(c) the most recent trading figures of the company, a balance sheet, a cash flow forecast and a profit forecast

(d) details of the management team, with evidence of a wide range of management skills

(e) details of major shareholders

(f) details of the company's current banking arrangements and any other sources of finance

(g) any sales literature or publicity material that the company has issued.

A high percentage of requests for venture capital are rejected on an initial screening, and only a small percentage of all requests survive both this screening and further investigation and result in actual investments.

Venture capital is risk capital, usually in the forms of loan and shares as a package, to provide a significant investment in a medium or large business.

The advantages of this are capital is supplied by venture capital firms who accept a certain degree of risk being inevitable. Also most venture capitalists also provide help in the form of back up management and financial expertise. Also the Government's Enterprise Investment Scheme offers incentives to private investors willing to invest in unquoted companies.

The disadvantages are that most venture capitalists are only interested in loans for more than £ 50,000 and some only consider ventures where more than £ 2,50,000 is involved, as the administration costs are not worthwhile on smaller projects. Also they charge a negotiation 20-40% in the firm's capital, as a return of their investment.

Franchising: Franchising is a method of expanding business on less capital than would otherwise be needed. For suitable businesses, it is an alternative to raising extra capital for growth. Franchisors include Budget Rent-a-Car, Wimpy, Nando's Chicken and Chicken Inn.

Under a franchising arrangement, a franchisee pays a franchisor for the right to operate a local business, under the franchisor's trade name. The franchisor must bear certain costs (possibly for architect's work, establishment costs, legal costs, marketing costs and the cost of other support services) and will charge the franchisee an initial franchise fee to cover set-up costs, relying on the subsequent regular payments by the franchisee for an operating profit. These regular payments will usually be a percentage of the franchisee's turnover.

Although the franchisor will probably pay a large part of the initial investment cost of a franchisee's outlet, the franchisee will be expected to contribute a share of the investment himself. The franchisor may well help the franchisee to obtain loan capital to provide his-share of the investment cost.

The advantages of franchises to the franchisor are as follows:

- The capital outlay needed to expand the business is reduced substantially.
- The image of the business is improved because the franchisees will be motivated to achieve good results and will have the authority to take whatever action they think fit to improve the results.

The advantage of a franchise to a franchisee is that he obtains ownership of a business for an agreed number of years (including stock and premises, although premises might be leased from the franchisor) together with the backing of a large organisation's marketing effort and experience. The franchisee is able to avoid some of the mistakes of many small businesses, because the franchisor has already learned from its own past mistakes and developed a scheme that works.

Corporate Bond: A corporate bond is a bond issued by a corporation to raise money effectively so as to expand its business. The term is usually applied to longer-term debt instruments, generally with a maturity date falling at least a year after their issue date.

Some corporate bonds have an embedded call option that allows the issuer to redeem the debt before its maturity date. Other bonds, known as convertible bonds, allow investors to convert the bond into equity.

Capital Notes: Capital notes are a form of convertible security exercisable into shares. They are equity vehicles. Capital notes are similar to warrants, except that they often do not have an expiration date or an exercise price (hence, the entire consideration the company expects to receive, for its future issue of shares, is paid when the capital note is issued). Many times, capital notes are issued in connection with a debt-for-equity swap restructuring: instead of issuing the shares (that replace debt) in the present, the company gives creditors convertible securities – capital notes – so the dilution will occur later.

Government Securities Market: Government securities market includes all those securities that are issued by the Central government and the state governments and other entities that are wholly owned by the government. They are also referred to as gilt-edged securities as the interest and repayment of principal are completely secured in this case. Depending upon the issuing body, securities can be classified into five categories:

- Central government securities
- State government securities
- Securities guaranteed by the Central Government for All India Financial Institutions like IDBI, IFCI, etc.
- Securities guaranteed by state government for state institutions like State Electricity Boards and Housing Boards.
- Treasury bills issued by the RBI

Stock Certificate: In case of stock issued by government, a stock certificate is given to the owner, which specifies that he is a registered holder in the book of Public Debt Office (PDO).

It indicates the interest rate, interest due dates and face value of the stock.

It is not transferable by endorsement. Transfer can take place only by means of a transfer deed, by which the transferee's name is substituted in the place of the transferor's name in the books of the PDO.

Interest payment by way of interest warrants and principal repayments are issued by the PDO to the domicile of the holder or to the specified local office of the RBI or any branch of the agent bank conducting government securities business in India.

International Equity Instruments:

Global Depository Receipts (GDRs): A depository receipt is a negotiable instrument that represents the beneficial interest in shares issued by a company. A GDR is an instrument in the form of a depository receipt or certificate created by the Overseas Depository Bank outside India and issued to non-resident investors against the issue of ordinary shares or foreign currency convertible bonds of the issuing company. Depository in the case of a GDR is located in a foreign country, whereas the custodian is located in the home country of the issuer.

American Depository Receipts (ADRs): It is a dollar denominated negotiable certificate and represents publicly traded equities of non-US companies. Foreign private companies can issue shares of stock on the U.S. equity markets using ADRs. This allows U.S. investors to purchase stock of foreign companies, while allowing foreign companies to benefit from the vast shareholder base and liquidity of U.S. markets.

International Debt Instruments:

Euro bonds: These are the bonds that are issued outside the country of the currency in which they are denominated. Some of their important characteristics are:

- No withholding of taxes of any kind on interest payments.
- These bonds are in bearer form with interest coupon attached.
- They are traded on one or more stock exchanges but are generally traded in the Over-the-Counter market.

The Eurobonds can be classified into two categories:

Fixed rate bonds/straight debt bonds: They are fixed interest-bearing securities, which are redeemable at face value. These bonds are redeemed by way of a lump sum amount at the end of the maturity period.

Floating Rate Notes (FRNs): They are bond issues with maturity period varying from 5 to 7 years and having varying coupon rates either pegged to another security or re-fixed at periodic intervals.

Foreign Bonds: These are bonds issued by foreign entities for raising medium to long-term financing from domestic money centers in their domestic currencies. The types of foreign bonds are:

Yankee Bonds: They are US dollar denominated bonds issued by foreign borrowers in the US markets.

Samurai Bonds: They are bonds issued by non-Japanese borrowers in the Japanese markets.

Bulldog Bonds: These are sterling denominated foreign bonds that are raised in the UK domestic securities market.

Shibosai Bonds: They are privately placed bonds issued in the Japanese markets.

Forex Market: As per the Foreign Exchange Regulation Act (1973) Sec. 2b, foreign exchange is defined as:

All deposits, credits, balance of payments in foreign currency and any drafts, travelers' cheques, letters of credit and bills of exchange expressed or drawn in Indian currency and payable in foreign currency;

Any instruments payable at the option of the drawee or holder thereof or any party thereto either in Indian currency or in foreign currency or partly in one and partly in the other.

Exchange rate is the rate at which one currency can be converted into another currency. It can be quoted in two ways:

Direct Quotation: In this case, the exchange rate is expressed as the price per unit of foreign exchange in terms of home currency equal to one unit of foreign currency.

Indirect quotation: In this method, the unit of home currency is kept constant and the exchange rate is expressed in terms of units of foreign currency.

Financial Institutions:

Industrial Development Bank of India (IDBI): It is an apex financial institution having the main objective of coordinating the functioning of all financial institutions. Some of its other functions are:

- To plan, promote and develop industries.
- To provide technical and administrative assistance for promotion or expansion of industry.
- To undertake market and investment research surveys.

Industrial Finance Corporation of India (IFCI): It is the first finance institution that was set up in 1948 by the Government of India with the objective of providing medium and long-term loans to large industrial concerns. Its resources are in the form of loans from the RBI, share capital, retained earnings, repayment of loans, bonds issue, loans from the government and credit from international markets.

Industrial Investment Bank of India (IIBI): It was established with the objective of financing the reconstruction and rehabilitation of sick and closed industrial units. Its functions include providing finance for the establishment of new industrial projects as well as for expansion, diversification and modernization of existing industrial enterprises. The other services provided by it are merchant banking, debt syndication and the entire package of services for mergers and acquisitions.

Export and Import Bank of India: It was set up in January 1982 as a statutory corporation wholly owned by the Central Government. It grants direct loans in India and outside for the purpose of exports and imports, refinances loans of banks and other notified financial institutions for the purpose of international trade, rediscounts usance export bills from banks, provides overseas investment finance for Indian companies towards their equity participation in joint ventures abroad and undertakes development of merchant banking activities in relation to export-oriented units.

State Financial Corporations: These were established for the purpose of providing finance to the small and medium sector, and to establish industrial estates. They provide finance in the form of term loans, by underwriting issues of shares and debentures, by subscribing to debentures and standing guarantee for loans raised from other institutions and from the general public.

State Industrial Development Corporations: They have been established to facilitate rapid industrial growth in the respective states. They also identify and sponsor projects in the joint sector with the private entrepreneur participation.

Investment Institutions

Life Insurance Corporation of India: It was established in 1956. Its central office is located in Mumbai. It is the general duty of the corporation to carry on life insurance business and to exercise its powers under the Act to ensure that the life insurance business is developed to the best advantage of the community. As per the LIC Act, it can invest up to 10% of the investible funds in the private sector. LIC provides finance by participating in a consortium with other institutions and does not undertake independent appraisal of projects.

General Insurance Corporation of India (GIC): GIC was established with the purpose of supervising, controlling and carrying on the business of general insurance. It can invest upto 30% of funds in the private sector. Like LIC, GIC also provides finance (depending upon the appraisal made by other financial institutions) by participating in a consortium.

Unit Trust of India: UTI commenced its operations from July 1964 "with a view to encouraging savings and investment and participation in the income, profits and gains accruing to the Corporation from the acquisition, holding, management and disposal of securities." Unit Trust of India (UTI) is India's first mutual fund organization. UTI manages funds amounting to Rs. 49,655.57 crore being the market value of investments as on 28th June 2002 (provisional) from 28.96 million investors under its 72 schemes. The faith and confidence of investors stems from UTI's commitment, as reflected in its long track record of over three decades, to ensure its investors safety, and to provide liquidity and attractive yield on their investments.

Mutual Funds: They help in mobilizing funds from various categories of investors and direct them into productive investments. Apart from UTI, there are many mutual funds that are sponsored by various bank subsidiaries, LIC, GIC, private sector institutions, etc. and operate within the framework of SEBI guidelines

Advantages and Disadvantages of Long-term Finance:

Advantages

- Long-term debt financing is usually less prone to short-term shocks as it is secured by formally established contractual terms. Hence, they are relatively more stable than short-term debt.
- Long-term debt financing is directly linked to the growth of the company's operating capacity (purchase of capital assets such as machinery).
- Long-term debt is normally well structured and defined. Thus fewer resources have to be channeled to monitor and maintain long-term debt financing accounts (compared to short-term debt financing such as supplier credit which, changes over time and need to be monitored on a regular basis).
- Long-term debt financing options such as leases offer a certain degree of flexibility, compared to having to purchase the asset (E.g., machinery).

Disadvantages

- Long-term debt is often costly to service (interest charges are higher).
- Long-term debt financiers usually demand a great amount of information from the company to perform its credit evaluation.
- Start-ups usually find it more difficult to obtain long-term debt financing, or if they do, at unfavorable terms, as they have almost no proven track record, low cash flow, and small asset base.
- Long-term debt financing contracts normally contain a lot of restrictive clauses and covenants, including the scope of business operations that the company is allowed to engage in, capital and management structure limitations, etc.

Illustration 1. On 1st January 2011 Parrot Ltd. purchased from Penguin Ltd. machinery under hire purchase system, ₹ 5,00,000 being paid on delivery and the balance in five Installments of ₹ 7,50,000 each payable half-yearly on 30th June and 31 st December. The vendor charges interest @ 10% per annum. The cash price of the machinery was ₹ 37,50,000.

You are required to show how this transaction should be recorded in the books of Parrot Ltd., by preparing Machinery Account and Penguin Ltd. Account, If depreciation rate is 10% per annum on the written down value of the machinery. The accounts are to be prepared for the first two years only.

Solution:

Dr. **In the books of Parrot Ltd.** **Cr.**

Machinery A/c

Date	Particulars	Amount ₹	Date	Particulars	Amount ₹
2011			2011		
01-01-01	To Penguin Ltd. A/c	37,50,000	31-12-11	By P&L A/c (Dep.)	3,75,000
			31-12-11	By Balance c/d	33,75,000
		37,50,000			37,50,000
2012			2012		
01-01-12	To Balance b/d	33,75,000	31-12-12	By P&L A/c (dep.)	3,37,500
			31-12-12	By Balance c/d	30,37,500
		33,75,000			33,75,000
2013					
01-01-13	To Balance b/d	30,37,500			

Dr. **Penguin Ltd.** **Cr.**

Date	Particulars	Amount ₹	Date	Particulars	Amount ₹
2011			2011		
01-01-11	To Bank A/c	5,00,000	01-01-11	By Machinery A/c	37,50,000
30-06-11	To Bank a/c	7,50,000	30-06-11	By Interest on HP A/c	1,82,500
31-12-11	To Bank a/c	7,50,000	31-12-11	By Interest on HP A/c	1,33,125
31-12-11	To Balance c/d	22,45,625			
		40,45,625			40,45,625
2012			2012		
30-06-12	To Bank A/c	7,50,000	01-01-12	By Bal. b/d	20,45,825
31-12-12	To Bank a/c	7,50,000	30-06-12	By Interest on HP A/c	1,02,281
31-12-12	To Balance c/d	7,17,801	31-12-12	By Interest on HP A/c	69,895
		22,17,801			22,17,801
			2013		
			01-01-13	By Balance b/d	7,17,801

Working Notes: Cash Price ₹ 37,50,000

Date	Instalment	Interest (10%)	Principal	Balance
01-01-11	5,00,000 *	—	5,00,000	32,50,000
30-06-11	7,50,000	1,82,500	5,87,500	26,62,500
31-12-11	7,50,000	1,33,125	6,16,875	20,45,825
30-08-12	7,50,000	1,02,281	6,47,719	13,97,906
31-12-12	7,50,000	69,895	6,80,105	7,17,801
30-06-13	7,50,000	32,199 (b/f)	7,17,801	

* Down Payment

Illustration 2. On 1st April 2011 Vyas Ltd. purchased from Nokia Ltd. under hire purchases system; ₹ 7,50,000 being paid on delivery and the balance in 5 equal installments 01 ₹ 11,25,000 each payable ball yearly on 30th September and 31st March. The Nokia Ltd. charges interest @ 10% p.a. The cash price of the machinery was ₹ 56,25,000. The depreciation rate is 10% p.a. on WDV method,

You are required to show Machinery A/c and Nokia Ltd. in the books of Vyas Ltd. for the year ended 31st March 2012 and 2013 only.

Solution:

In the Books of Vyas Ltd.

Dr. Machinery A/c Cr..

Date	Particulars	Amount (₹)	Date	Particulars	Amount (₹)
01-04-11	To Nokia Ltd,	56,25,000	31-03-12	By Depreciation a/c (10% on WDV)	5,62,500
			31-03-12	By Balance c/d	50,62,500
		5625000			56,25,000
01-04-12	To Balance bid	50,62,500	31-03-13	By Depreciation a/c (10% on WDV)	5,06,250
			31-03-13	By Balance c/d	45,56250
		50,62500			50,62,500
01-04-13	To Balance b/d	45,56,250			

Dr. Nokia Ltd A/c Cr

Date	Particulars	Amount (₹)	Date	Particulars	Amount (₹)
01-04-11	To Bank a/c	7,50,000	01-04-11	By Machinery a/c	56,25,000
30-09-12	To Bank a/c	11,25,000	30-09-11	By Interest a/c	2,43,750
31-03-12	To Bank a/c	11,25,000	31-03-12	By Interest a/c	1,99,688
31-03-12	To Balance c/d	30,68,438			
		60,68,438			60,68,438
30-09-12	To Bank a/c	11,25,000	01-04-12	By Balance b/d	30,68,438
31-03-13	To Bank a/c	11,25,000	30-09-12	By Interest a/c	1,53,422
31-03-13	To Bal. c/d	10,76,703	31-03-13	By Interest a/c	1,04,843
		33,26,703			33,26,703

Working Note:

(1) Calculation of Interest

Particulars	(₹)
Cash Price	56,25,000
Less: Down Payment (Cash)	7,50,000
	48,75,000
Balance Instalments paid (11,25,000 × 5)	5625,000
Interest	7,50,000

Analvsis of Payment of Hire Purchase

Year	Cost of Machine at the beginning of the Period	Payment of Installment	Interest @ 10%	Principal Repayment	Cost of Machine at the end of the Period
01-04-11	56,25,000	7,50,000	—	7,50,000	48,75,000
30-09-11	48,75,000	11,25,000	2,43,750	8,81,250	39,93,750
31-03-12	39,93,750	11,25,000	1,99,688	9,25,312	30,68,438
30-09-12	30,68,438	11,25,000	1,53,422	9,71,578	20,96,860
31-03-13	11 25,000	104843	10,20,157	1076703	
Total		6250,000	7,50000	6000000	

Figures rounded off to the nearest rupee.

Illustration 3. M/s. Sehwag and Co. purchased a machinery worth ₹ 7,92,500 (Cash Price) from M/s Gambhir and Bros. on 1st January 2012. It was agreed by both the parties that the payment of machinery will be done as under:

Down Payment ₹ 1,58,500 on the date of purchase and the balance will be discharged in four half-yearly installment of ₹ 2 lakhs each, commencing from 30th June, 2012.

Your are required to prepare Machinery Account and M/s. Gambhir and Bros. Account in the books of M/s. Sehwag and Co. for calendar years 2012 and 2013 considering that M/s. Shewag and Co. closes its books of account on 31 st December every year and charges depreciation on machinery @ 10% p.a. on Written Down Value Method.

Solution:

In the Books of M/s. Sehwag and Co.

Dr. **Machinery A/c** **Cr.**

Date	Particulars	Amount ₹	Date	Particulars	Amount ₹
01-01-12	To Gambhir & Co.	7,92,500	31-12-12	By Depreciation a/c (10%)	79,250
			31-12-12	By Balance	7,13,250
		7,92,500			7,92,500
01-01-13	To Balance b/d	7,13,250	31-12-13	By Depreciation a/c (10%)	71,325
			31-12-13	By Balance c/d	6,41,925
		713,250			713,250

Dr. **M/s Gambhir and Bros a/c** **Cr.**

Date	Particulars	Amount ₹	Date	Particulars	Amount ₹
01-01-12	To Bank a/c	1,58,500	01-01-12	By Machinery	7,92,500
30-06-12	To Bank a/c	2,00,000	30-06-12	By Interest	16,600
31-12-12	To Bank a/c	2,00,000	31-12-12	By Interest	33,200
31-12-12	To Balance c/d	2,83,800			
		8,42,300			8,42,300
30-06-13	To Bank a/c	2,00,000	01-01-12	By Balance b/d	2,83,800
31-12-13	To Bank a/c	2,00,000	30-06-13	By Interest	49,8000
			30-12-13	By Interest	66,400
		4,00,000			4,00,000

Calculations of Interest·

Particulars	Amount ₹
Cash Price	7,92,500
Less: Cash 1st Installment	1,58,500
	6,34,000
Balance paid (2,00,000 × 4)	8,00,000
Interest	1,66,000

30-06-12	16,600	1
31/12/12	33,200	2
30-0613	49,800	3
31/12-13	66,400	4
	1,66,000	

Illustration 4. Rose Ltd. has purchased machinery from Machinewala Ltd. on hire purchase basis. The details of purchase are: Cash Price ₹ 31,70,000. Down Payment 20% and remaining amount to be discharged in four half yearly Installments of ₹ 8,00,000 each. Prepare a table to show the analysis of payment and calculation of interest.

Solution:

Rose Ltd.

Analysis of Payment of Hire Purchase

Year	Cost of Machine at the beginning of the year	Payment of Installment	Interest @ 10%	Principal Repayment	Cost of Machine at the end of the year
	31,70,000	6,34,000	—	6,34,000	25,36,000
1	25,36,000	8,00,000	2,53,600	5,46,400	19.89,600
2	19,89,600	8,00,000	1,98,960	6,01,040	13,88,560
3	13,88,560	8,00,000	1,38,856	6,61,144	7,27,416
4	7,27,416	8,00,000	72,584	7,27,416	—
Total		38,34,000	6,64,000	31,70,000	—

* Rounding off difference adjusted

Workings:

(1) Down Payment = Cash Price × 20%

= 31,70,000 × 20%

= A 6,34,000

(2) $$\frac{\text{Cost of Asset}}{\text{PVAF of ₹ 1 @ \_\_\% for \_\_years}}$$

$$\text{PVAF} = \frac{\text{Cost of Asset Less Down Payment}}{\text{Instalment}}$$

$$= \frac{25,36,000}{8,00,000}$$

PVAF @ 10% = 3.17

(***Note:*** In the Question instead of 4 half yearly installments It should be 4 yearly Installments.)

Illustration 5. Lotus Ltd. issued shares of As. 10 each amounting to As. 100 lakhs. The company appointed a merchant banker as book-runner who collected Information from various investors to book-building purpose. The quote prices of various investors are:

A quoted price for each share @ ₹ 9.50 for ₹ 10 Lakhs

B quoted price for each share @ ₹ 9.80 for ₹ 50 Lakhs

C quoted price for each share @ ₹ 10.10 for ₹ 10 Lakhs

D quoted price for each share @ ₹ 10.00 for ₹ 20 Lakhs

E quoted price for each share @ ₹ 9.90 for ₹ 10 Lakhs

Based on the above information and data, compute the weighted average Issue price as would be calculated by the merchant banker for book-building purposes.

Solution:

Lotus Ltd.

Investors	No. of Shares ×	Quoted Price per Share =	Total Quoted Amount
A	1,05,263.15	9.50	10,00,000
B	5,10,204.08	9.80	50,00,000
C	99,009.90	10.10	10,00,000
D	2,00,000.00	10.00	20,00,000
E	1,01,010.10	9.90	10,00,000
Total	10.15,487.23	9.85	1,00,00,000

$$\text{Weighted Average Issue Price} = \frac{\text{Total Quoted Amount}}{\text{Total Number of Shares}}$$

$$= \frac{1,00,00,000}{10,15,487.23}$$

Weighted Average Issue Price = ₹ 9.85 per Share

EXERCISE

Self-assessment Questions 1

1. Short-term finance is essential for _____ day to day expenditure.
2. Overdraft limit is granted on the basis of _____ of customer.
3. Banks ask for _____ security while granting cash credit.
4. While making payment on discounted bill, banks deduct _____ which is equal to the amount of interest for the period of bill.
5. When suppliers extend credit to the buyers it is called _____.
6. Under _____ and _____ cash does not flow in.

[**Ans.** (1) meeting (2) credit worthiness (3) collateral (4) discount (5) trade credit (6) trade credit, instalment credit.]

Self-assessment Questions 2

1. Raising funds for short-term purposes is _____ (costly, economical).
2. Short-term finance _____ serve long-term purpose (may, does not)

3. Trade credit is for a _____ period of time but bank credit may be extended. (specific, uncertain)
4. Payment after a specific date is _____ in case of bank credit. (compulsory, not compulsory)
5. Discounting of bill _____ cash immediately (provides/does not provide).

[**Ans.** (1) economical (2) may (3) specific (4) not compulsory (5) provides]

Self-assessment Questions 3

(i) Limit in case of cash credit is generally less than that in case of bank overdraft.

(ii) Bank overdraft is granted on the basis of credit-worthiness of customer.

(iii) The method of charging interest is same in case of bank overdraft and cash credit.

(iv) Banks do not open separate account while advancing cash credit.

(v) Besides personal security of borrower, banks insist upon the security of tangible goods while granting loan.

Answers to Self-assessment Questions 3

[(i) F (ii) T (iii) T (iv) F (v) T

Self-assessment Questions 4

1. Instalment credit facilitates purchase of assets and equipments.
2. Customers' advances do not make cash immediately available.
3. Loans from co-operative banks are easily available to farmers for productive purposes.
4. Repayment is not made in case of customers' advances.
5. Co-operative credit facilitates replacements and renovation.

Answers to Self-assessment Questions 4

[(i) True (ii) False (iii) True (iv) True (v) False]

Terminal Questions 1

1. Why short-term finance is a necessity for business enterprises?
2. List the various sources of short-term finance.
3. Under what circumstances bank credit is preferable to trade credit.
4. Enumerate the various points of difference between cash credit and bank overdraft.
5. What are the differences between bank loan and bank overdraft?
6. Write any five equipments which you think should be taken on instalment credit. Give reasons for your answer.
7. What are the merits of customers' advance.

Sources of Finance. Mini Case Study:

Outdoor Living Ltd., an owner-managed company, has developed a new type of heating using solar power, and has financed the development stages from its own resources. Market research indicates the possibility of a large volume of demand and a significant amount of additional capital will be needed to finance production.

Advise Outdoor Living Ltd. on:

(a) the advantages and disadvantages of loan or equity capital

(b) the various types of capital likely to be available and the sources from which they might be obtained

(c) the method(s) of finance likely to be most satisfactory to both Outdoor Living Ltd. and the provider of funds.

Terminal Questions 2

(1) On 1st January 2011, Jackson Ltd. purchased from India Ltd. machinery under hire purchase system, ₹ 10,00,000 being paid on delivery and the balance in five installments of ₹ 15,00,000 each payable half-yearly on 30th June and 31st December. The vendor charges interest @ 10% per annum. The cash price of the machinery was ₹ 75,00,000.

You are required to show how this transaction should be recorded In the books of Jackson Ltd., by preparing Machinery Account and India Ltd. Account, if depreciation rate is 10% per annum on the written down value of the machinery. The accounts are to be prepared for the first two years only.

(2) Kite Ltd. has purchased machinery from Lion Ltd. on hire purchase basis. The details of purchase are: Cash Price ₹ 63,40,000. Down Payment 20% and remaining amount to be discharged in four yearly Installments of ₹ 16,00,000 each. Prepare a table to show the analysis of payment and calculation of interest.

(3) On 1st January 2011, Marie Ltd. purchased from Nest Ltd. machinery under hire purchase system, ₹ 2,50,000 being paid on delivery and the balance In five installments of ₹ 3,75,000 each payable half-yearly on 30th June and 31st December. The vendor charges Interest @ 10% per annum. The cash price of the machinery was ₹ 18,75,000.

You are required to show how this transaction should be recorded in the books of Marie Ltd., by preparing Machinery Account and Nest Ltd. Account, If depreciation rate is 10% per annum on the written down value of the machinery. The accounts are to be prepared for the first two years only.

(4) King Ltd. has purchased machinery from Queen Ltd. on hire purchase basis. The details of purchase are: Cash Price ₹ 15,85,000. Down Payment 20% and remaining amount to be discharged In four yearly Installments of ₹ 4,00,000 each. Prepare a table to show the analysis of payment and calculation of interest.

(5) Calculate NAV of a Sunshine Mutual Fund as on 31/03/2012 from the given information:

No. of Funds Outstanding Units: 6,000

Market Value of all Mutual Fund Holdings: ₹ 8,20,962

Liabilities of Mutual Fund Holdings: ₹ 2,20,962

(6) Calculate NAV of a UTI Mutual Fund as on 31/03/2012 from the given Information:

No. of Funds Outstanding Units: 29,000

Market Value of all Mutual Fund Holdings: ₹ 2,18,96,422

Liabilities of Mutual Fund Holdings: ₹ 82,00,422

(7) Echo Ltd. Issued shares of ₹ 20 each amounting to ₹ 200 lakhs. The company appointed a merchant banker as book-runner who collected information from various investors for book-building purpose. The quote prices of various investors are:

A quoted price for each share @ ₹ 19.00 for ₹ 20 Lakhs

B quoted price for each share @ ₹ 19.60 for ₹ 100 Lakhs

C quoted price for each share @ ₹ 20.20 for ₹ 20 Lakhs

D quoted price for each share @ ₹ 20.00 for ₹ 40 Lakhs

E quoted price for each share @ ₹ 19.80 for ₹ 20 Lakhs

Based on the above Information and data, compute the weighted average issue price as would be calculated by the merchant banker for book-building purposes.

(8) Foxtrot Ltd. Issued shares of ₹ 50 each amounting to ₹ 500 lakhs. The company appointed a merchant banker as book-runner who collected information from various investors to book-building purpose. The quote prices of various investors are:

A quoted price for each share @ ₹ 47.50 for ₹ 50 lakhs

B quoted price for each share @ ₹ 49.00 for ₹ 250 Lakhs

C quoted price for each share @ ₹ 50.50 for ₹ 50 Lakhs

D quoted price for each share @ ₹ 50.00 for ₹ 100 Lakhs

E quoted price for each share @ ₹ 49.50 for ₹ 50 Lakhs

Based on the above information and data, compute the weighted average issue price as would be calculated by the merchant banker for book-building purposes.

r r r

Chapter 5

Cost of Capital

INTRODUCTION

Capital structure is the mix of long-term sources of funds like debentures, loans, preference shares, equity shares and retained earnings in different ratios. It is always advisable for companies to plan their capital structure. Decisions taken by not assessing things in a correct manner may jeopardize the very existence of the company. Firms may prosper in the short-run by not indulging in proper planning but ultimately may face problems in future. With unplanned capital structure, they may also fail to economize the use of their funds and adapt to the changing conditions.

Designing an Ideal Capital Structure

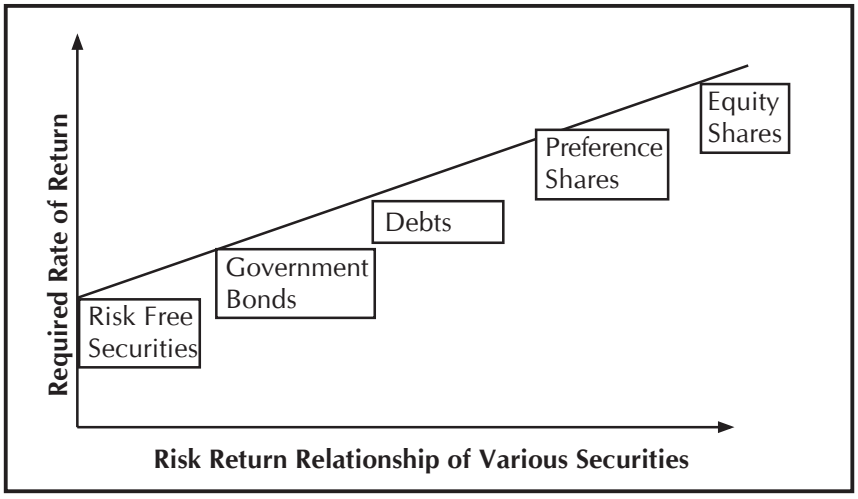
It requires a number of factors to be considered such as:

- **Return:** The capital structure of a company should be most advantageous. It should generate maximum returns to the shareholders for a considerable period of time and such returns should keep increasing.
- **Risk:** As already discussed in the previous chapter on leverage, use of excessive debt funds may threaten the company's survival. Debt does increase equity holders' returns and this can be done till such time that no risk is involved.
- **Flexibility:** The company should be able to adapt itself to situations warranting changed circumstances with minimum cost and delay.
- **Capacity:** The capital structure of the company should be within the debt capacity. Debt capacity depends on the ability for funds to be generated. Revenues earned should be sufficient enough to pay creditors' interests, principal and also to shareholders to some extent.
- **Control:** An ideal capital structure should involve minimum risk of loss of control to the company. Dilution of control by indulging in excessive debt financing is undesirable.

With the above points on ideal capital structure, raising funds at the appropriate time to finance firm's investment activities is an important activity of the Finance Manager. Golden

opportunities may be lost for delaying decisions to this effect. A combination of debt and equity is used to fund the activities. What should be the proportion of debt and equity? This depends on the costs associated with raising various sources of funds. The cost of capital is the minimum rate of return a company must earn to meet the expenses of the various categories of investors who have made investment in the form of loans, debentures, equity and preference shares. A company no being able to meet these demands may face the risk of investors taking back their investments thus leading to bankruptcy. Loans and debentures come with a pre-determined interest rate, preference shares also have a fixed rate of dividend while equity holders expect a minimum return of dividend based on their risk perception and the company's past performance in terms of pay-out of dividends.

The following graph on risk-return relationship of various securities summarizes the above discussion.



Now that we are familiar with the different sources of long-term finance, let us find out what it costs the company to raise these various types of finance. The cost of capital to a company is the minimum rate of return that it must earn on its investments in order to satisfy the various categories of investors who have made investments in the form of shares, debentures or term loans. Unless the company earns this minimum rate, the investors will be tempted to pull out of the company, leave alone participate in any further capital investment in that company. For example, equity investors expect a minimum return as dividend on their perception of the risk undertaken based on the company's past performance, or on the returns they are getting from shares they have of other companies.

The weighted arithmetic average of the cost of different financial resources that a company uses is termed as its cost of capital. Let us look at a simple example. A company has a total capital base of ₹ 500 lakh in the ratio of 1:1 of debt-equity i.e., divided equally between debt and equity; ₹ 250 lakh of debt and ₹ 250 lakh of equity. If the post-tax costs of debt and equity are 7% and 18% respectively, the cost of capital to the company will be equal to the weighted average cost i.e.,

$$\frac{250}{500} \times 7\% + \frac{250}{500} \times 18\% = 12.5\%.$$

Assumptions

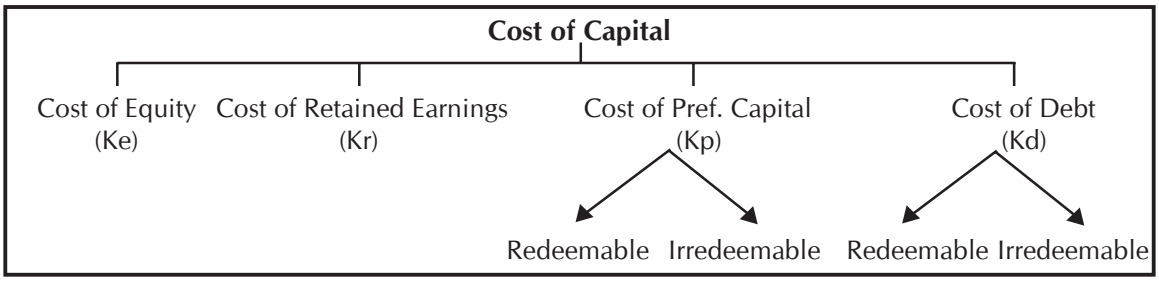
Given this definition of cost of capital, it must be noted that the use of this measure for appraising new investments will depend upon two important assumptions:

(a) the risk characterizing the new project under consideration is not significantly different from the risk characterizing the existing investments of the firm, and

(b) the firm will continue to pursue the same financing policies. Put differently, there will be no deviation from the debt-equity mix presently adopted by the firm.

For calculating the cost of capital of the firm, we have to first define the cost of various sources of finance used by it. The sources of finance that are typically tapped by a firm are: (a) debentures, (b) term loans, (c) preference capital, (d) equity capital, and (e) retained earnings. The mechanics involved in computing the costs of these sources of finance are discussed in the following section.

COSTS OF DIFFERENT SOURCES OF FINANCE



Cost of Debentures: The cost of a debenture is defined as the discount rate which equates the net proceeds from issue of debentures to the expected cash outflows in the form of interest and principal repayments, i.e.,

$$P = \sum_{t=1}^{n} \frac{I(1-t)}{(1+k_d)^t} + \frac{F}{(1+K_d)^n} \quad \ldots (1)$$

where,

k_d = Post-tax cost of debenture capital

I = Annual interest payment per debenture capital

t = Corporate tax rate

F = Redemption price per debenture

P = Net amount realized per debenture and

n = Maturity period.

The interest payment (I) is multiplied by the factor (1 – t) because interest on debt is a tax-deductible expense and only post-tax costs are considered. An approximation formula as given below can also be used.

$$k_d = \frac{I(1-t) + \frac{F-P}{n}}{\frac{F+P}{2}} \quad \ldots (2)$$

Note: When the difference between the redemption price and the net amount realized can be written off evenly over the life of the debentures and the amount so written-off is allowed as a tax-deductible expense, the above two equations can be changed as follows:

Equation (1) becomes

$$P = \sum_{t=1}^{n} \frac{I(1-t) - \frac{(F-P)t}{n}}{(1+k_d)} + \frac{F}{(1+k_d)^n}$$

Equation (2) becomes

$$k_d = \frac{I(1-t) + \frac{F-P}{n}}{\frac{F+P}{2}}$$

The following illustration illustrates the application of this formula.

Illustration 1. Ajax Limited has recently made an issue of non-convertible debentures for ₹ 400 lakh. The terms of the issue are as follows: each debenture has a face value of ₹ 100 and carries a rate of interest of 14 per cent. The interest is payable annually and the debenture is redeemable at a premium of 5 per cent after 10 years.

If Ajax Limited realizes ₹ 97 per debenture and the corporate tax rate is 50 per cent, what is the cost of the debenture to the company?

Solution: Given I = ₹ 14, t = 0.5, P = ₹ 97, and n = 10 years, F = ₹ 105, the cost per debenture (k_d) will be:

$$k_d = \frac{14(1-0.5) + \frac{105-97}{10}}{\frac{105+97}{2}} = 7.7 \text{ per cent}$$

Illustration 2. Lakshmi Enterprise wants to have an issue of non-convertible debentures for ₹ 10 Cr. Each debenture is of a par value of ₹ 100 having an interest rate of 15%. Interest is

payable annually and they are redeemable after 8 years at a premium of 5%. The company is planning to issue the NCD at a discount of 3% to help in quick subscription. If the corporate tax rate is 50%, what is the cost of debenture to the company?

Solution:

$$k_d = \frac{I(1-T)+\{(F-P)/n\}}{(F+P)/2}$$

$$= \frac{15(1-0.5)+(105-97)/8}{(105+97)/2}$$

$$= \frac{7.5+1}{101}$$

$$= 0.084 \text{ or } 8.4\%$$

Cost of Term Loans: The cost of the term loans will be simply equal to the interest rate multiplied by (1 – tax rate). The interest rate to be used here will be the interest rate applicable to the new term loan. The interest is multiplied by (1 – tax rate) as interest on term loans is also tax deductible.

$k_t = I\ (1 - t)$

Where,

I = Interest rate

t = Tax rate.

Illustration 3. Yes Ltd. has taken a loan of ₹ 50,00,000 from Canara Bank at 9% interest. What is the cost of term loan if the tax rate is 40%?

Solution:

$$K_t = I(1 - T) = 9(1 - 0.4) = 5.4\%$$

Cost of Preference Capital: The cost of a redeemable preference share (k^p) is defined as that discount rate which equates the proceeds from preference capital issue to the payments associated with the same i.e. dividend payment and principal payments, which can be.

$$P = \sum_{t=1}^{n} \frac{D}{(1+k_p)^t} + \frac{F}{(1+k_p)^n} \quad \ldots (3)$$

where,

k_p = Cost of preference capital

D = Preference dividend per share payable annually

F = Redemption price

P = Net amount realized per share and

n = Maturity period

An approximation formula as given below can also be used.

$$k_p = \frac{D + \frac{F - P}{n}}{\frac{F + P}{2}} \quad \ldots (4)$$

Illustration 4. The terms of the preference share issue made by Color-Dye-Chem are as follows: Each preference share has a face value of ₹ 100 and carries a dividend rate of 14 per cent payable annually. The share is redeemable after 12 years at par. If the net amount realized per share is ₹ 95, what is the cost of the preference capital?

Solution:

Given that D = 14, F = 100, P = 95 and n = 12

$$k_p = \frac{14 + \frac{100 - 95}{12}}{\frac{100 + 95}{2}} = 0.148 \text{ or } 14.8 \text{ per cent}$$

Illustration 5. C2C Ltd. has recently come out with a preference share issue to the tune of ₹ 100 lakhs. Each preference share has a face value of 100 and a dividend of 12% payable. The shares are redeemable after 10 years at a premium of ₹ 4 per share. The company hopes to realize ₹ 98 per share now. Calculate the cost of preference capital.

Solution:

$$k_p = \frac{D + \{(F - P)/n\}}{(F + P)/2}$$

$$= \frac{12 + (104 - 98)/10}{(104 + 98)/2}$$

$$= \frac{126}{101}$$

$$k_p = 0.1247 \text{ or } 12.47\%$$

Cost of irredeemable preference share capital (k_p) = D/NP × 100

Where, D = Divided

NP = Net Proceed

Is Equity Capital free of Cost?

Some people are of the opinion that equity capital is free of cost for the reason that a company is not legally bound to pay dividends and also the rate of equity dividend is not fixed like preference dividends. This is not a correct view as equity shareholders buy shares with the expectation of dividends and capital appreciation. Dividends enhance the market value of shares and therefore equity capital is not free of cost.

Cost of Equity Capital: Measuring the rate of return required by the equity shareholders is a difficult and complex exercise because the dividend stream receivable by the equity shareholders is not specified by any legal contract (unlike in the case of debenture holders). Several approaches are adopted for estimating this rate of return like the dividend forecast approach, capital asset pricing approach, realized yield approach, earnings-price ratio approach, and the bond yield plus risk premium approach.

According to the dividend forecast approach, the intrinsic value of an equity stock is equal to the sum of the present values of the dividends associated with it, i.e.,

$$P_e = \sum_{t=1}^{n} \frac{D_t}{(1+k_e)^t} \quad \ldots (5)$$

where,

P_e = Price per equity share

D_t = Expected dividend per share at the end of year one, and

k_e = Rate of return required by the equity shareholders.

If we know the current market price (P_e) and can forecast the future stream of dividends, we can determine the rate of return required by the equity shareholders (k_e) from equation (5) which is nothing but the cost of equity capital. In practice, the model suggested by equation (5) cannot be used in its present form because it is not possible to forecast the dividend stream completely and accurately over the life of the company. Therefore the growth in dividends can be categorized as nil or constant growth or super normal growth and the equation (5) can be modified accordingly. How to value a security given the required rate of return and pattern of growth, has already been discussed in the chapter 'Valuation of Securities'. Cost of equity from the company's point of view is nothing but the rate at which the intrinsic value of the market price of the share is equal to the discounted value of the dividends. For instance, assume a constant growth rate (g) in DPS. Assuming a constant growth rate in dividends, the equation (5) can be simplified as follows:

$$P_e = \sum_{t=1}^{n} \frac{D_1}{k_e - g} \quad \ldots (6)$$

If the current market price of the share is given (P_e), and the values of D_1 and g are known, then the equation (6) can be rewritten as $k_e = \frac{D_1}{P_e} + g$

The following illustration illustrates the application of this formula.

Illustration 6. The market price per share of Mobile Glycols Limited is ₹ 125. The dividend expected per share a year hence is ₹ 12 and the DPS is expected to grow at a constant rate of 8 per cent per annum. What is the cost of the equity capital to the company?

Solution:

The cost of equity capital (ke) will be:

$$k_e = \frac{D_1}{P_e} + g = \frac{12}{125} + 0.08 = 17.6 \text{ per cent}$$

Illustration 7. Suraj Metals are expected to declare a dividend of ₹ 5 per share and the growth rate in dividends is expected to grow @ 10% p.a. The price of one share is currently at ₹ 110 in the market. What is the cost of equity capital to the company?

Solution:

$$k_e = (D_1/P_e) + g$$
$$= (5/110) + 0.10$$
$$= 0.1454 \text{ or } 14.54\%$$

Realized Yield Approach: According to this approach, the past returns on a security are taken as a proxy for the return required in the future by the investors. The assumptions behind this approach are that (a) the actual returns have been in line with the expected returns, and (b) the investors will continue to have the same expectations from the security. As these assumptions generally do not hold good in real life, the results of this approach are normally taken as a starting point for the estimation of the required return.The realized return over a n-year period is calculated as $(W_1 \times W_2 \times .....W_n)^{1}/_{n-1}$

Where W_t, referred to as the wealth ratio, is calculated as $\frac{D_t + P_t}{P_{t-1}}$ and t = 1, 2.... n.

D_t = Dividend per share for year t payable at the end of year

P_t = Price per share at the end of year t.

Illustration 8.

Year	1	2	3
DPS(₹)	1.50	2.00	1.50
Price per share at the end of the year	12.00	11.00	12.00

The wealth ratios are:

If the price per share at the beginning of the year 1 is ₹ 10.

Year	1	2	3
Wealth ratio	1.35	1.08	1.23

Realized yield = (1.35 × 1.08 × 1.23)1/3 – 1

= 0.2149 or 21.5%

Capital Assets Pricing Model Approach: This model establishes a relationship between the required rate of return of a security and its systematic risks expressed as β. According to this approach, the cost of equity is reflected by the following equation:

$$k_i = R_f + \beta_i (R_m - R_f) \quad \ldots (7)$$

where,

k_i = Rate of return required on security i

R_f = Risk-free rate of return

β_i = Beta of security i

R_m = Rate of return on market portfolio.

The CAPM model is based on some assumptions, some of which are:

- Investors are risk-averse.
- Investors make their investment decisions on a single-period horizon.
- Transaction costs are low and therefore can be ignored. This translates to assets being bought and sold in any quantity desired. The only considerations mattering are the price and amount of money at the investor's disposal.
- All investors agree on the nature of return and risk associated with each investment.

Illustration 9. What is the rate of return for a company if its β is 1.5, risk free rate of return is 8% and the market rate or return is 20%**.**

Solution:

$$k_e = R_f + \beta(R_m - R_f)$$
$$= 0.08 + 1.5(0.2 - 0.08)$$
$$= 0.08 + 0.18$$
$$= 0.26 \text{ or } 26\%$$

Bond Yield Plus Risk Premium Approach: The logic behind this approach is that the return required by the investors is directly based on the risk profile of a company. This risk profile is adequately reflected in the return earned by the bondholders. Yet, since the risk borne by the equity investors is higher than that by the bondholders, the return earned by them should also be higher. Hence this return is calculated as:

Yield on the long-term bonds of the company + Risk premium.

This risk premium is a very subjective figure which is arrived at after considering the various operating and financial risks faced by the firm. Though these risks are already factored in the bond yield, since by nature equity investment is riskier than investments in bonds and is exposed to a higher degree of the firm's risks, they also have an impact on the risk-premium. For example, let us take two companies A and B, A having a net profit margin of 5% and B of 10% with other things being equal. Since company B faces less downside risk compared to company A, it will have to pay less interest to its bondholders. Hence, the risk of a company

is already accounted for in the bondholders' return. Yet, when it comes to estimating the equityholders' risk premium, these risks are considered all over again because the equityholders are going to bear a larger part of these risks. In fact, these risks being taken into account for fixing the bondholders' return will result in a multiple increase in the equityholders' risk. Hence, the equityholders of company A will receive a higher risk premium than those of company B.

Earnings Price Ratio Approach: According to this approach, the cost of equity can be calculated as:

$k_e = E_1/P$

where,

E_1 = Expected EPS for the next year

P = Current market price per share

E1 can be arrived at by multiplying the current EPS by (1 + growth rate).

This ratio assumes that the EPS will remain constant from the next year onwards.

There are two parameters which have to be analyzed to see if this approach will provide an accurate result or not. They are dividend payout ratio and the rate of return the firm is capable of earning on the retained earnings. The results are accurate in the following two scenarios:

- When all the earnings are paid out as dividends. Here the rate of return the firm is capable of earning becomes irrelevant. or,
- The dividend payout ratio is less than 100 per cent and retained earnings are expected to earn a rate of return equal to the cost of equity.

In all other cases there is scope for this approach not giving an accurate estimate. The option (a) is not normally seen in real life situations, while it is difficult to foresee the option (b). This approach should hence be used with caution.

Cost of Retained Earnings: Earnings of a firm can be reinvested or paid as a dividend to the shareholder. If the firm retained part of its earnings for future growth of the firm, the shareholder will demand compensation from the firm for using that money. As a result, the cost of retained earnings simply represents a shareholder's expected return from the firm's common stock. Viewing retained earnings as fully subscribed issued of additional common stock we can set the firm's cost of retained earnings k_r to the cost of equity capital.

i.e., $k_r = k_e$

The cost of retained earnings is always less than the cost of new issue of common stock due to absence of floating costs when projects with retained earnings.

Cost of External Equity: Cost of external equity comes into the picture when there are certain floatation costs involved in the process of raising equity from the market. It is the rate of return that the company must earn on the net funds raised, in order to satisfy the equityholders' demand for return. Under the dividend capitalization model, the following formula can be used for calculating the cost of external equity:

$$K'_e = \frac{D_1}{P_0 (1-f)} + g$$

where,

K'_e = cost of external equity

D_1 = dividend expected at the end of year 1

P_0 = current market price per share

g = constant growth rate applicable to dividends

f = floatation costs as a percentage of the current market price.

For all other approaches, there is no particular method for accounting for the floatation costs. The following formula can be used as an approximation in such cases:

$$K'_e = k_e/(1-f)$$

where,

k_e = rate of return required by the equity investors

K'_e = cost of external equity

f = floatation costs as a percentage of the current market price.

Illustration 10. Asbestos Limited has got ₹ 100 lakh of retained earnings and ₹ 100 lakh of external equity through a fresh issue, in its capital structure. The equity investors expect a rate of return of 18%. The cost of issuing external equity is 5%. The cost of retained earnings and the cost of external equity can be determined as follows: Cost of retained earnings:

$k_r = k_e$ i.e., 18%

Cost of external equity raised by the company:

Now $K'_e = \frac{k_e}{1-f} = \frac{0.18}{1-0.05} = 18.95\%$

Illustration 11. Alpha Ltd. requires ₹ 400 Cr to expand its activities in the southern zone of India. The company's CFO is planning to get ₹ 250 Cr through a fresh issue of equity shares to the general public and for the balance amount he proposes to use ½ of the reserves which are currently to the tune of ₹ 300 Cr. The equity investors' expectations of returns are 16%. The cost of procuring external equity is 4%. What is the cost of external equity?

Solution:

We know that $k_e = k_r$, that is k_r is 16%

Cost of external equity is:

$K'_e = k_e/(1-f)$

$= 0.16/(1-0.04) = 0.1667$ or 16.67%

Weighted Average Cost of Capital: In the previous section we have calculated the cost of each component in the overall capital of the company. The term cost of capital refers to the

overall composite cost of cap or the weighted average cost of each specific type of fund. The purpose of using weighted average is to consider each component in proportion of their contribution to the total fund available. Use of weighted average is preferable to simple average method for the reason that firms do not procure funds equally from various sources and therefore simple average method is not used. The following steps are involved to calculate the WACC.

Step I: Calculate the cost of each specific source of fund, that of debt, equity, preference capital and term loans.

Step II: Determine the weights associated with each source.

Step III: Multiply the cost of each source by the appropriate weights.

Step IV: WACC = $W_e k_e + W_r k_r + W_p k_p + W_d k_d + W_t k_t$

Assignment of Weights: Weights can be assigned based on any of the below mentioned methods:

1. The book values of the sources of funds in the capital structure,
2. Present market value of the funds in the capital structure and
3. In the proportion of financing planned for the capital budget to be adopted for the next period.

As per the book value approach, weights assigned would be equal to each source's proportion in the overall funds. The book value method is preferable. The market value approach uses the market values of each source and the disadvantage in this method is that these values change very frequently.

Illustration 12. Prakash Packers Ltd. has the following capital structure:

	₹ in lakhs
Equity Capital (₹ 10 par value)	200
14% Preference Share Capital ₹ 100 each	100
Retained Earnings	100
12% Debentures (₹ 100 each)	300
11% Term loan from ICICI Bank	50
Total	750

The market price per equity share is ₹ 32. The company is expected to declare a dividend per share of ₹ 2 per share and there will be a growth of 10% in the dividends for the next 5 years. The preference shares are redeemable at a premium of ₹ 5 per share after 8 years and are currently traded at ₹ 84 in the market. Debenture redemption will take place after 7 years at a premium of ₹ 5 per debenture and their current market price is ₹ 90 per unit. The corporate tax rate is 40%. Calculate the WACC.

Solution:

Step I: is to determine the cost of each component.

$k_e = (D_1/P_0) + g$

$= (2/32) + 0.1$

$= 0.1625$ or 16.25%

$k_p = [D + \{(F - P)/n\}]/(F + P)/2$

$= [14 + (105 - 84)/8]/(105 + 84)/2$

$= 16.625/94.5$

$= 0.1759$ or 17.59%

$k_r = k_e$ which is 16.25%

$k_d = [I(1 - T) + \{(F - P)/n\}]/\{F + P)/2\}$

$= [12(1 - 0.4) + (105 - 90)/7]/(105 + 90)/2$

$= [7.2 + 2.14]/97.5$

$= 0.096$ or 9.6%

$k_t = I(1 - T)$

$= 0.11(1 - 0.4)$

$= 0.066$ or 6.6%

Step II: is to calculate the weights of each source.

$W_e = 200/750 = 0.267$

$W_p = 100/750 = 0.133$

$W_r = 100/750 = 0.133$

$W_d = 300/750 = 0.4$

$W_t = 50/750 = 0.06$

Step III: Multiply the costs of various sources of finance with corresponding weights and WACC calculated by adding all these components.

$WACC = W_ek_e + W_pk_p + W_rk_r + W_dk_d + W_tk_t$

$= (0.267 \times 0.1625) + (0.133 \times 0.1759) + (0.133 \times 0.1625) + (0.4 \times 0.092) + (0.06 \times 0.066)$

$= 0.043 + 0.023 + 0.022 + 0.0384 + 0.004$

$= 0.1304$ or 13.04%

Illustration 13. Johnson Cool Air Ltd., would like to know the WACC. The following information is made available to you in this regard.

The after tax cost of capital are:

- Cost of debt 9%
- Cost of preference shares 15%
- Cost of equity funds 18%

The capital structure is as follows:

- Debt ₹ 6,00,000
- Preference capital ₹ 4,00,000
- Equity capital ₹ 10,00,000

Solution:

Fund source	Amount	Ratio	Cost	Weighted cost
Debt	₹ 6,00,000	0.3	0.09	0.027
Preference capital	₹ 4,00,000	0.2	0.15	0.03
Equity capital	₹ 10,00,000	0.5	0.18	0.09
Total	**₹ 20,00,000**	**1.0**		**0.147**

WACC is 14.7%

Illustration 14. Manikyam Plastics Ltd. wants to enter into the arena of plastic moulds next year for which it requires ₹ 20 Cr. to purchase new equipment. The CFO has made available the following details based on which you are required to compute the weighted marginal cost of capital.

- The amount required will be raised in equal proportions by way of debt and equity (new issue and retained earnings put together account for 50%).
- The company expects to earn ₹ 4 Cr as profits by the end of year of which it will retain 50% and pay off the rest to the shareholders.
- The debt will be raised equally from two sources – loans from IOB costing 14% and from the IDBI costing 15%.
- The current market price per equity share is ₹ 24 and dividend pay out one year hence will be ₹ 2.40.

Solution:

Source of Funds	Weights	After Tax Cost	Weighted Cost
Equity Capital	0.4	0.1	0.04
Retained Earnings	0.1	0.1	0.01
14% loan from IOB	0.25	0.07	0.0175
15% IDBI loan	0.25	0.075	0.01875
Total			**0.0863 or 8.63%**

$k_e = (D_1/P_0) + g$

$= (2.40/24) = 0.1$ or 10%

$k_t = I(1 – T)$

$= 0.14(1 – 0.5) = 0.07$ or 7%

$k_t = I(1 – T)$

$= 0.15(1 – 0.5) = 0.075$ or 7.5%

Illustration 15. Canara Paints has paid a dividend of 40% on its share of ₹ 10 in the current year. The dividends are growing @ 6% p.a. The cost of equity capital is 16%. The Company's top Finance Managers of various zones recently met to take stock of the competitors' growth and dividend policies and came out with the following suggestions to maximize the wealth of the shareholders. As the CFO of the company you are required to analyze each suggestion and take a suitable course keeping the shareholders' interests in mind.

Alternative 1: Increase the dividend growth rate to 7% and lower k_e to 15%

Alternative 2: Increase the dividend growth rate to 7% and increase k_e to 17%

Alternative 3: Lower the dividend growth rate to 4% and lower k_e to 15%

Alternative 4: Lower the dividend growth rate to 4% and increase k_e to 17%

Alternative 5: increase the dividend growth rate to 7% and lower k_e to 14%

Solution:

We all know that $P_0 = D_1/(k_e – g)$

Present case = 4/(0.16-0.06) = ₹ 40

Alternative 1 = 4.28/(0.15 – 0.07) = ₹ 53.5

Alternative 2 = 4.28/(0.17 – 0.07) = ₹ 42.8

Alternative 3 = 4.16/(0.15 – 0.04) = ₹ 37.8

Alternative 4 = 4.16/(0.17 – 0.04) = ₹ 32

Alternative 5 = 4.28/(0.14 – 0.07) = ₹ 61.14

Recommendation: The last alternative is likely to fetch the maximum price per equity share thereby increasing their wealth.

Illustration 16. Ventura Home Appliances Ltd. has the following capital structure:

	₹ in lakhs
Equity Capital (10 lakh shares at par value)	100
12 per cent preference capital (10,000 shares at par value)	10
Retained earnings	120
14% Non-convertible Debentures (70,000 debentures at par value)	70
14% term loan from APSFC	100
Total	**400**

The market price per equity share is ₹ 25. The next expected dividend per share (DPS) is ₹ 2.00 and the DPS is expected to grow at a constant rate of 8 per cent. The preference shares are redeemable after 7 years at par and are currently quoted at ₹ 75 per share on the stock exchange. The debentures are redeemable after 6 years at par and their current market quotation is ₹ 90 per share. The tax rate applicable to the firm is 50 per cent. Calculate the weighted average cost of capital.

Solution: We will adopt a three-step procedure to solve this problem.

Step I: Determine the costs of the various sources of finance. We shall define the symbols ke, kr, kp, kd and ki to denote the costs of equity, retained earnings, preference capital, debentures, and term loans respectively.

Note: Market price can be taken as a close substitute of the net amount realizable per share or debenture.

Step II: Determine the weights associated with the various sources of finance.One issue to be resolved before concluding this section relates to the system of weighting that must be adopted for determining the weighted average cost of capital. The weights can be used on: (i) book values of the sources of finance included in the present capital structure, (ii) present market value weights of the sources of finance included in the capital structure and (iii) proportions of financing planned for the capital budget to be adopted for the forthcoming period.Let us assume the book value approach and the weights of a source of fund, according to book value approach is equal to the book value of that particular source divided by the total of the book values of all sources i.e., weight given to equity would be equal to book value of equity divided by book value of equity, retained earnings, debt, preference shares (if any). Similarly the weights according to the market value approach is equal to the market value of a particular source divided by the market value of all sources. For instance, weight attached to equity is equal to the market value of equity divided by the market value of equity, debt, preference shares, if any.We shall define the symbols W_e, W_r, W_p, W_d and W_i to denote the weights of the various sources of finance.

$$W_e = \frac{100}{400} = 0.25$$

$$W_r = \frac{120}{400} = 0.30$$

$$W_p = \frac{10}{400} = 0.025$$

$$W_d = \frac{70}{400} = 0.175$$

$$W_i = \frac{100}{400} = 0.25$$

Step III: Multiply the costs of the various sources of finance with the corresponding weights and add these weighted costs to determine the weighted average cost of capital (WAC). Therefore,

$$\begin{aligned} WAC &= W_e k_e + W_r k_r + W_p k_p + W_d k_d + W_i k_i \\ &= (0.25 \times 0.16) + (0.30 \times 0.16) + (0.025 \times 0.1780) + (0.175 \times 0.0912) + (0.25 \times 0.07) \\ &= 0.1259 \text{ or } 12.59 \text{ per cent.} \end{aligned}$$

Illustration 17. Deepak steel has issued non-convertible debentures for ₹ 5 Cr. Each debenture is of a par value of ₹ 100 carrying a coupon rate of 14%. Interest is payable annually and they are redeemable after 7 years at a premium of 5%. The company issued the NCD at a discount of 3%. What is the cost of debenture to the company? Tax rate is 40%.

Solution:

$$\begin{aligned} k_d &= \frac{I(1-T) + \{(F-P)/n\}}{(F+P)/2} \\ &= \frac{14(1-0.04) + (105-97)/7}{(105+97)/2} \\ &= \frac{8.4 + 1.14}{101} \\ &= 0.094 \text{ or } 9.4\% \end{aligned}$$

Illustration 18. Supersonic industries Ltd. has entered into an agreement with Indian Overseas Bank for a loan of ₹ 10 Cr with an interest rate of 10%. What is the cost of the loan if the tax rate is 45%?

Solution:

$$\begin{aligned} k_t &= I(1-T) \\ &= 10(1-0.45) \\ &= 5.5\% \end{aligned}$$

Illustration 19. Prime group issued preference shares with a maturity premium of 10% and a coupon rate of 9%. The shares have a face a value of ₹ 100. and are redeemable after 8 years. The company is planning to issue these shares at a discount of 3% now. Calculate the cost of preference capital.

Solution:

$$k_p = \frac{D + \{(F - P)/n\}}{(F + P)/2}$$

$$= \frac{-9 + (110 - 97)/8}{(110 + 97)/2}$$

$$= \frac{-9 + 1.625}{103.5} = 10.27\%$$

Illustration 20:

S Ltd. has the following Capital Structure:

		(₹ in Lakhs)
Equity	2,00,000 Shares	40.00
6% Preference	1,00,000 Shares	10.00
8% Debentures	3,00,000 Shares	30.00
		80.00

It proposes to borrow ₹ 20.00 lakhs with interest at 10% p.a. The dividend on equity will increase from ₹ 2 to ₹ 3 per share. You are required to ascertain the change in the Weighted Average Cost of Capital consequent to proposed borrowings.

Solution:

Amount (₹ in lakhs)	Dividend	Cost %	Proportion %	Cost
40 Equity	4,00,000	10	50.0	5.00
10 Preference	60,000	6	12.5	0.75
30 Debentures	2,40,000	8	37.5	3.00
	7,00,000		100.0	8.75

Weighted Average Cost = 8.75%.

Proposal

	(₹ in lakhs)	Proportion %	Cost %	Weighted Average Cost
Equity	40	40	15	6.00
Preference	10	10	6	0.60
8% Debentures	30	30	8	2,40
10% Debentures	20	20	10	2.00
	100	W.A. Cost		11.00%

There will be a net increase of 2.25% p.a.

Illustration 21. A company has on its books the following amounts and specific costs of each type of capital:

Type of Capital	B.V. ₹	M.V. ₹	Specific Cost %
Debt	4,00,000	3,80,000	5
Preference	1,00,000	1,10,000	8
Equity	6,00,000	12,00,000	13
Retained Earnings	2,00,000	—	9
	13,00,000	16,90,000	

Determine the Weighted Average Cost of Capital using:

1. B.V. Weights.
2. Market Value Weights.

Solution:

Type of Capital	B.V. ₹	Specific Cost %	Proportion %	Cost
Debt	4,00,000	5	30.77	1.54
Preference Capital	1,00,000	8	7.69	0.62
Equity Capital	6,00,000	13	46.15	6.00
Retained Earnings	2,00,000	9	15.3	.L.l8.
	13,00,000	W.A.Cost		9.54

Type of Capital	M.V. ₹	Specific Cost %	Proportion %	Cost
Debt	3,80,000	5	22.49	1.12
Preference Capital	1,10,000	8	6.50	0.52
Equity Capital	12,00,000	13	71.00	9.23
Retained Earnings	—	9	—	—
	16,90,000		W.A.Cost	10.87

Illustration 22. Three companies A, Band C are in the same type of business and hence have similar operating risks. However, the capital structure of each of them is different and the following are the details:

		A	B	C
Equity Share Capital	₹	4,00,000	2,50,000	5,00,000
[Face Value ₹ 10 per Share)				
Market Value per Share	₹	15	20	12
Dividend per Share	₹	2.70	4	2.88
Debentures	₹	Nil	·1,00,000	2,50,000
[Face Value per Debenture ₹ 100]				
Market Value per Debenture	₹	—	125	80
Interest rate		—	10%	8%

Assume that the current levels of dividends are generally expected to continue indefinitely and the income-tax rate at 50%.

You are required to compute weighted average cost of capital of each company.

Solution:

Cost of Equity:

$$K_E = \frac{\text{Dividend}}{\text{Market Value}} \times 100$$

$$\text{Company A} = \left(\frac{2.70}{15}\right) \times 100 = 18\%$$

$$\text{Company B} = \left(\frac{4}{20}\right) \times 100 = 20\%$$

$$\text{Company C} = \left(\frac{2.88}{12}\right) \times 100 = 24\%$$

Cost of Debt:

$$K_D = \frac{\text{Interest}\,(1 - \text{Tax})}{\text{Market Value}} \times 100$$

$$\text{Company B} = \frac{₹\,10(1 - 0.50)}{₹\,125} \times 100 = 4\%$$

$$\text{Company C} = \frac{₹\,8(1 - 0.50)}{₹\,80} \times 100 = 5\%$$

(at Market Value)

Name of Company	Equity		Debt	
	₹	%	₹	%
A	6,00,000	100	—	—
B	5,00,000	80	1,25,000	20
C	6,00,000	75	2,00,000	25

WACC (at Market Values of Debt and Equity)

= (Cost of Equity × % of Equity) + (Cost of Debt × % of Debt)

A = (18% × 1.00) = 18%

B = (20% × 0.80) + (4% × 0.20) = 16.8%

C = (24% × 0.75) + (5% × 0.25) = 19.25%

Illustration 23. The following is an extract from the financial statements of KPN Ltd.:

(₹ lakhs)

	₹
Operating Profit	105
Less: Interest on Debentures	33
	72
Less: Income-tax	36
Net Profit	36
Equity Share Capital (Shares of ₹ 10 each)	200
Reserves and Surplus	100
15% Non-convertible Debentures (of ₹ 100 each)	220
	520

The market price per equity share is ₹ 12 and per debenture ₹ 93.75.

1. What is the Earning per Share?
2. What is the Percentage Cost of Capital to the company for the Debenture Funds and the Equity?

Solution:

1. Earning per Share

$$EPS = \frac{\text{Net Profit after Tax}}{\text{No. of Equity Shares}}$$

$$= \frac{₹\,36,00,000}{20,00,000 \text{ Shares}}$$

$$= ₹\,1.80$$

2. Calculation of Cost of Equity and Cost of Debt

(a) Cost of Equity (based on Earnings per Share)

$$K_E = \frac{E}{MV}$$

Where, E = Expected Earnings per Share

MV = Market Value per Share

$$K_E = \frac{₹ 1.8}{₹ 12} \times 100$$

$$= 15\%$$

(b) Cost of Debt (based on its Market Value)

$$K_D = \frac{\text{Annual Interest } (1 - \text{Tax Rate})}{\text{Market Value of Debentures}} \times 100$$

$$= \frac{₹ 33,00,000\ (1 - 0.50)}{₹ 2,06,25,000} \times 100$$

$$= 8\%$$

lllustration 24. The following information has Fashions Ltd. as on 31st March, 2009 been extracted from the Balance Sheet of Fashions Ltd. as on 31st March, 2009.

(₹ lakhs)

Equity	400
12% Debentures	400
Term loan (Interest 18%)	1,200
	2,000

1. Determine the weighted average cost of capital of the company. It had been paying dividends at a consistent rate of 20% p.a.
2. What difference will it make if the current price of the ₹ 100 share is ₹ 160?
3. Determine the effect of Income-tax on the cost of capital under both premises.

Solution:

1. Calculation of Weighted Average Cost of Capital of Fashions Ltd. based on Book Value and before consideration of tax shield on interest:

Sources of Capital	Amount (₹ lakhs)	Proportion to Total Capital %	Cost of Capital %	Weighted Cost of Capital
Equity	400	0.20	20	4.00
12% Debentures	400	0.20	12	2.40
Term Loan (18%)	1,200	0.60	18	10.80
Total	2.000	1.00		17.20

The Weighted Average Cost of Capital of the company is 17.2% based on the book value of equity,

2. Calculation of Weighted Average Cost of Capital based on Market Price but before considering tax shield on interest:

Source of Capital	Proportion to Total Capital %	Cost of Capital %	Weighted Cost of Capital %
Equity	0.20	12.5*	02.5
12% Debentures	0.20	12	02.4
Term Loan 18%	0.60	18	10.8
Total	1.00		15.7

*Cost of Equity Capital based on Market Price of Equity Share.

$$= \frac{20}{160} \times 100 = 12.5\% \text{ p.a}$$

3. Calculation of Weighted Average Cost of Capital based on Book Value and after considering tax shields (Assumption Tax rate @ 50%).

Sources of Capital	Cost of Capital %	Tax Shield %	Net Cost of Capital	Proportion of Capital	Weighted Cost
Equity	20	—	20	0.20	4.00
12% Debentures	12	0.5	6	0.20	l.20
Term Loan (18%)	18	0.5	9	0.60	5.40
Weighted Average Cost of Capital					10.60

Calculation of Weighted Average Cost of Capital based on Market Price of Equity Shares and after considering tax shields (Assumption Tax rate @ 50%).

Sources of Capital	Cost of Capital %	Tax Shield %	Net Cost of Capital	Proportion of Capital	Weighted Cost
Equity	12.5	—	12.5	0.20	2.50
12% Debentures	12	0.5	6.0	0.20	l.20
Term Loan (18%)	18	0.5	9.0	0.60	5.40
Weighted Average Cost of Capital					9.10

Illustration 25. (Computation of Cost of Equity Capital, Cost of Debentures, Cost of Preference Shares and Weighted Average Cost of Capital)

You are required to determine the Weighted Average Cost of Capital (Ko) of the K.C. Ltd. using:

1. Book Value Weights; and
2. Market Value Weights.

The following information is available for your perusal.

The K.C. Ltd.'s present book value capital structure is:

(₹ lakhs)

	₹
Debentures (₹ 100 per Debenture)	8,00,000
Preference Shares (₹ 100 per Share)	2,00,000
Equity Shares (₹ 10 per Share)	10,00,000
	20,00,000

All these securities are traded in the capital markets. Recent prices are debentures @ ₹ 110, preference shares @ ₹ 120 and equity shares @ ₹ 22. Anticipated external financing opportunities are:

(i) ₹ 100 per Debenture redeemable at par:

20-year Maturity, 8% Coupon Rate, 4% Flotation Cost, Sale Price ₹ 100.

(ii) ₹ 100 Preference Share Redeemable at par:

15-year Maturity, 10% Dividend Rate, 5% Flotation Costs, Sale Price ₹ 100.

(iii) Equity Shares ₹ 2 per Share Flotation Costs, Sale Price ₹ 22.

In addition, the Dividend expected on the Equity Share at the end of the year ₹ 2 per Share; the anticipated growth rate in Dividends is 5% and the company has the practice of paying all its earning in the form of Dividends. The corporate tax rate is 50%.

Solution:

Calculation of Weighted Average Cost of Capital (WACC)

(i) Cost of Equity Capital (K_e)

$$Ke = \frac{D_1}{Po\,(1-f)} + g$$

Where K_e = Cost of Equity Capital

D_1 = Expected Dividend

$P_o\,(1-f)$ = Sale Price – Flotation Cost

g = Growth Rate in Dividend

By substituting, we get;

$$K_e = \frac{₹\,2}{₹\,22 - ₹\,2} + 0.05$$

$$= \frac{₹\,2}{₹\,20} + 0.05$$

$$= 0.15 \text{ or } 15\%$$

(ii) Cost of Debentures (K_d)

$$K_d = \frac{\left[1 + \left(\frac{RV - SV}{N}\right)\right](1-T)}{\left(\frac{RV + SV}{2}\right)}$$

Where K_d = Cost of Debentures

I = Annual Interest Payment

RV = Redeemable Value of Debentures at the time of Maturity

SV = Out Sale Value from the issue of Debentures
(Less of Discount and Flotation Expenses)

N = Term of Maturity Period of Debenture

T = Tax Rate

By substituting, we get,

$$K_d = \frac{\left[₹\,8 + \left(\frac{₹\,100 - 96}{20}\right)\right](1 - 0.50)}{\left(\frac{₹\,100 - 96}{2}\right)}$$

$$= \frac{(₹\,820)\,(0.50)}{₹\,98}$$

$$= \frac{(₹\,4.10}{₹\,98}$$

= 0.0418

= 4.18%

(iii) Cost of Preference Shares (Kp)

$$K_p = \frac{\left[D + \left(\frac{RV - SV}{N}\right)\right]}{\left(\frac{RV + SV}{2}\right)}$$

Where K_n = Cost of Preference Shares

D = Constant Annual Dividend Payment

N = Maturity Period Preference Shares

By substituting we get

$$= \frac{₹\,10 + \left(\frac{₹\,100 - ₹\,95}{15}\right)}{\left(\frac{₹\,100 + ₹\,95)}{2}\right)}$$

$$= \frac{₹\,10.44}{₹\,97.5}$$

= 0.1059 or 10.59%

1. Weighted Average Cost of Capital (K_O) based on Book Value of Weights:

Sources of Capital	Book Value ₹	%	Cost of Capital	Total Cost
Equity Capital	10,00,000	0.50	0.1500	0.0750
Preference Capital	2,00,000	0.10	0.1059	0.0106
Debentures	8,00,000	0.40	0.0418	0.0167
Total	20,00,000	1.00		·0.1023

K_o = 10.23%

2. Weighted Average Cost of Capital (K_O) based on Market Value of Weights:

Sources of Capital	Market Value ₹	%	Cost of Capital	Total Cost
Equity Share Capital	22,00,000	0.6626	0.1500	0.09939
Preference Share Capital	2,40,000	0.0723	0.1059	0.00766
Debentures	8,80,000	0.2651	0.0418	0.01108
Total	33,20,000	1.0000		0.11813

K_o = 11.81%

Illustration 26: A company has various alternatives of capital debt mix and cost thereof as under:

Debt as % of Total Capital	Cost of Debt %	Cost of Equity %
0	5.0	12.00
10	5.0	12.00
20	5.0	12.50
30	5.50	13.00
40	5.50	13.00
50	6.00	13.50
60	6.00	14.00
70	7.00	14.50
80	7.00	15.00
90	7.50	15.00
100	7.50	15.00

Suggest optimal debt equity mix.

A company has cost of debt at 6% and cost of equity is 14%. The Debt Equity proportion is 3%.

Calculate weighted average cost of capital.

Solution:

Statement of Composite Cost of Capital

Debt as 9% Total Capital	Cost of Debt	Cost of Equity	Composite Cost of Capital			
0	5.00	12.00	(5 × 0)	+ (12 × 1)	=	12.00
10	5.00	12.00	(5 × 0.10)	+ (12 × 0.90)	=	11.30
20	5.00	12.50	(5 × 0.20)	+ (12.5 × 0.80)	=	11.00
30	5.50	13.00	(5.5 × 0.30)	+ (13 × 0.70)	=	10.75
40	5.50	13.00	(5.5 × *OAO)*	+ (13 × 0.60)	=	10.00
50	6.00	13.50	(6 × 0.50)	+ (13.5 × 0.50)	=	9.75
60	6.00	14.00	(6 × 0.60)	+ 14 × *OAO)*	=	9.20
70	7.00	14.50	(7 × 0.70)	+ (14.5 × 0.30)	=	9.25
80	7.00	15.00	(7 × 0.80)	+ (15 × 0.20)	=	8.65
90	7.50	15.00	(7.5 × 0.90)	+ (15 × 0.10)	=	8.25
100	7.50	15.00	(7.50 × 1.00) +	(15 × 0)	=	7.50

Optimal Debt Equity Mix for company is 100% Debt.

0% Capital.

100% Total Capital Employed.

The composite cost of capital will be the least i.e. 7.50%.

Source	Cost (After tax)	Weights Capital	Weighted Cost
Debt	0.06	0.03	0.0018
Equity	0.14	0.97	0.1358
Total		1.00	0.1376

Weighted Average cost of capital = 0.1376 or 13.76%.

Illustration 27. A Ltd. share is quoted in the market at ₹ 20 currently. The company paid a dividend of ₹ 2 per share and the investor expect a growth rate of 5 per cent per year.

Compute:

(i) The Company's equity cost of capital.

(ii) If the anticipated growth rate is 8%. What would be the indicated market price of the share?

(iii) If the company's cost of capital is 12% and the anticipated growth rate is 5% p.a. What would be the indicated market price if the dividend of ₹ 2 per share is to be maintained?

B Ltd. has the following capital structure:

	₹
Equity shares	60 lakhs
12% Preference Shares	10 lakhs
14% Debentures	30 lakhs
Total	100 lakhs

The market price of the company's share is ₹ 20. It is expected that the company will pay next year a dividend of ₹ 2 per share which will grow at 8 percent for ever. Assume 40% tax rate.

You are required to:

(i) Compute weighted average cost of capital based on existing capital structure.

(ii) Compute the new weighted average cost of capital if the company raises an, additional ₹ 20 lakhs debt by issuing 15% debentures.

This would result in increasing the expected dividend to ₹ 3 per share and leave the growth rate unchanged but the price of the share will fall to ₹ 16.

Solution:

I. In the books of A Ltd.

(i) Cost of Equity Capital $= \left(\frac{\text{Dividend}}{\text{Price}} \times 100\right) + \text{GrowthRate\%}$

$= \left(\frac{₹\,2}{₹\,20} \times 100\right) + 4\%$

2. Market Price $= \frac{\text{Dividend}}{\text{Cost of Equity Capital} - \text{Growth Rate \%}}$

$= \frac{2}{12\% - 8\%}$

$= ₹\,28.57$

(iii) Market Price $= \frac{2}{12\% - 5\%}$

$= 28.57$

2. Weighted Average Cost of Capital on Existing Capital Structure

Source	Amount ₹	After Tax Cost	Weights	Weighted Cost
Equity Share Capital	60,00,000	0.18	0.60	0.108
12% Preference Share Capital	10,00,000	0.12	0.10	0.012
14% Debentures	30,00,000	0.084	0.30	0.0252
Weighted Average				—
Cost of Capital				0.1452

$$\text{Cost of Equity Capital} = \left(\frac{2}{20} \times 100\right) + 8\% = 18\%$$

Weighted Average Cost of Capital = 14.52%

New Weighted. Average Cost of Capital

Source	Amount ₹	After Tax Cost	Weights	Weighted Cost
Equity Share Capital	60,00,000	0.2675	0';0	0.13375
12% Preference Share Capital	10,00,000	0.12	0.083	0.00996
14% Debentures	30,00,000	0.084	0.25	0.021
15% Debentures	20,00,000	0.09	0.167	0.01503
Weighted Average				0.17974

Cost of Capital Weighted

$$\text{Cost of Equity Capital} = \left(\frac{3}{16} \times 100\right) + 8\% = 26.75\%$$

New Weighted Average Cost of Capital = 17.97%

Illustration 28. From the following capital structure of a Ltd., company you are required to calculate over all cost of capital using:

1. Book value weights.
2. Market value weights.

Source	Book Value ₹	Market Value ₹
Equity Share Capital (₹ 10/- Shares)	45,000	90,000
Retained Earnings	15,000	—
Preference Share Capital	10,000	10,000
Debentures	30,000	30,000

The after Tax cost of different sources is as follows:

Equity Share Capital	14%
Retained Earnings	13%
Preference Share Capital	10%
Debentures	5%

Solution:

Calculation of Weighted Average Cost of Capital (Book Value)

Source	₹	Cost %	Total Cost ₹
Equity Share Capital	45,000	14	6,300
Retained Earnings	15,000	13	1,950
Preference Share Capital	10,000	10	1,000
Debentures	30,000	05	1,500
Total	1,00,000		10,750

$$\text{Weighted Average Cost} = \frac{10,750}{1,00,000} \times 100 = 10.75\%$$

Weighted Average Cost (at Market Value)

Source	₹	Cost %	Total Cost ₹
Equity Share Capital	90,000	14	12,600
Retained Earnings	—	13	—
Preference Share Capital	10,000	10	1,000
Debentures	30,000	5	1,500
Total	1.30,000		15,100

$$\text{Weighted Average Cost} = \frac{15,100}{1,30,000} \times 100 = 11.62\%$$

Illustration 29. Three companies A, Band C are in the Same type of business and hence have similar operating risks. However, the capital structure of each of them is different and following are the details:

	A	B	C
Equity Share Capital [Face Value ₹ 10]	4,00,000	2,50,000	5,00,000
Market Value per share	15	20	12
Dividend per Share	2.70	4	2.88
Debentures [Face Value ₹ 100]	Nil	1,00,000	2,50,000
Market Value per Debenture	—	125	80
Interest rate	—	10%	8%

Assume that the current levels of dividend are generally expected to continue indefinitely and tax rate is 50%.

Prepare weighted average cost of capital of each company.

Solution:

$$\text{Cost of Equity} = \frac{\text{Dividend}}{\text{Market Value}} \times 100$$

$$\text{Company A} = \frac{2.70}{15} \times 100 = 18\%$$

$$\text{Company B} = \frac{4}{20} \times 100 = 20\%$$

$$\text{Company C} = \frac{2.88}{12} \times 100 = 24\%$$

$$\text{Cost of Debentures} = \frac{\text{Interest}\,(1 - \text{tax})}{\text{Market Value}} \times 100$$

$$\text{Company B} = \frac{10(1 - 0.50)}{125} \times 100 = 4\%$$

$$\text{Company C} = \frac{8(1 - 0.50)}{80} \times 100 = 5\%$$

Company	Equity			At Market Value		
				Debentures		
	₹	%	₹	%	₹	%
A	6,00,000	100	—	—	6,00,000	100
B	5,00,000	80	1,25,000	20	6,25,000	100
C	6,00,000	75	2,00,000	25	8,00,000	100

Weighted Average Cost of Capital (at Market Value of Equity and Debentures)

= (Cost of Equity × % of Equity) + (Cost of Debt × % of Debt)

A = (18% × 1.00) = 18%

B = (20% × 0.80) + (4% × 0.20) = 16.8%

C = (24% × 0.75) + (5% × 0.25) = 19.25%

Illustration 30. A The capital structure of H Ltd. as on 31st December, 2008 is as follows:

Equity Capital: 10 lakhs shares of ₹ 10 each = ₹ 1 crore

Reserves = ₹ 20 lakhs

14% Debentures of ₹ 100 each = ₹ 30 lakhs

For the year ended 31st December, 2008; the company has paid equity dividend at 20%. As the company is a market leader with good future, dividend is likely to grow by 5% every year. The equity shares are now traded at ₹ 80 per share in the stock exchange.

Income tax rate applicable to the company is 40%. You are required to calculate:

A The current weighted average cost of capital.

B The company has plans to raise a further ₹ 50 lakhs by way of long-term loan at 15% interest. When this takes place, the market value of the equity shares is expected to fall to ₹ 50 per share. What will be the new weighted average cost of capital of the company?

B. 'L' Ltd. is considering raising of funds of ₹ 100 lakhs with anyone of the alternatives. First is 14% institutional term loan and second is 13% NCD's would involve cost of issue of ₹ 1 lakh. Advise the company as to the better option based on the effective cost of capital in each case. Assume a tax rate of 40%.

Solution:

A. Current Weighted Average Cost of Capital:

Cost of 14% Debentures = 14 (1 – 0.4) = 8.40%

Cost of Equity Capital = $\left\{\frac{2}{80} \times 100\right\} + 5\%$ = 7.5%

Dividend per share 20% of ₹ 10 = ₹ 2

Weighted Average Cost of Capital

Sources	Amount ₹ in lakhs	Proportion	Cost of Capital	Weighted Cost
Equity Capital	100	2/3	7.5%	5.00%
Reserves	20	2/15	7.5%	1.00%
14% Debentures	30	1/5	8.4%	1.68%
Total	150			7.68%

Weighted Average Cost of Capital after further long-term loan:

Cost of 14% Debentures = 14 (1 – 0.4) = 8.40%

Cost of 15% Long term Loan = 15(1 – 0.4) = 9%

Lost of Equity Capital = $\left[\frac{2}{50} \times 100\right] + 5\% = 9\%$

Weighted Average Cost of Capital

Sources	Amount ₹ in lakhs	Proportion	Cost	Weighted Cost
Equity Capital	100	1/2	9%	4.50%
Reserves	20	1/10	9%	0.90%
14% Debentures	30	3/20	8.4%	1.26%
15% Long-term Loan	50	1/4	9%	2.25%
Total	200			8.91%

(b) L Ltd.

Cost of Debt of 14 % term loan:

= 14 (1 – 0.40)

= 8.40%

Cost of Capital of 13% NCD's:

NCD's amount	100	lakhs
Less: Discount 2.5%	2.5	lakhs
Less: Cost of issue	1.0	lakhs
Net proceeds of issue	96.5	lakhs

Cost of Debt = $\frac{13,00,000\,(1-0.40)}{96,50,000} \times 100$

= 8.08%

Therefore, 13% NCDs is the better option.

Illustration 31. 'A' Ltd. has following capital structure as on 31st December, 2008:

	₹
10% Debentures	6,00,000
9% Preference Shares	4,00,000
5,000 Equity Shares of ₹ 100 each	5,00,000
	15,00.000

The Equity Shares of the Company are quoted at ₹ 100 and the Company expected to declare a dividend of ₹ 9 per share for 2008. The company has registered dividend growth rate of 5% which is expected to be maintained. The tax rate applicable to the company is 40%.

Calculate:

1. The weighted average cost of capital
2. The revised weighted average cost of capital, if the company raises additional term loan of ₹ 5,00,000 at 12% for expansion. In such a situation the company can increase the dividend from ₹ 9 to ₹ 10 per share but the market price of the share would go down to ₹ 90.

'B' Ltd. is a widely held company. It is considering a major expansion of its production facilities and the following alternatives are available:

Capital	(i)	(ii)	(iii)
Share capital (₹ in Lakhs)	50	20	10
14% Debentures (₹ in Lakhs)	—	20	15
15% Term loan (₹ in Lakhs)	—	10	25
Total	20	50	50

The Company's Earnings Before Interest and Taxes (EBIT) is 25%. The rate of dividend of the Company is not less than 20%. The Company at present has low debt. Corporate taxation is 40%. Which of the alternatives would you choose?

Solution:

Weighted Average Cost of Capital

Source	Proportion	Cost of Funds %	Weighted Cost
10% Debentures	$\frac{6}{15}$	6	$6 \times \frac{6}{15} = 2.40$
9% Preference Shares	$\frac{4}{15}$	9	$9 \times \frac{4}{15} = 2.40$
Equity Shares	$\frac{5}{15}$	14	$14 \times \frac{5}{15} = 4.67$
Weighted Average Cost			9.47

$$\text{Cost of Debentures} = \text{Rate of Interest} - \text{Tax Savings}$$

$$= 10\% - (10\% \times 4\%)$$

$$\text{Cost of Equity Shares} = \frac{\text{Dividend}}{\text{Market Value}} + \text{Growth}$$

$$= \frac{9}{100} + 0.05$$

$$= 14\%$$

Weighted Average Cost after Additional Loan of ₹ 5,00,000

Source	Proportion	Cost of Funds %	Weighted Cost
10% Debentures	$\frac{6}{20}$	6	$6 \times \frac{6}{20} = 1.80$
12% Loan	$\frac{5}{20}$	12 - 4.8 = 7.20	$7.20 \times \frac{5}{20} = 1.80$
9% Preference Shares	$\frac{4}{20}$	9	$9 \times \frac{4}{20} = 1.80$
Equity Shares	$\frac{5}{20}$	16.11	$16.11 \times \frac{5}{20} = 4.03$
Weighted Average Cost			9.43

$$\text{Cost of Equity Shares} = \frac{\text{Dividend}}{\text{Market Price}} + \text{Growth}$$

$$= \frac{10}{90} + 0.05$$

$$= 16.11\%$$

Statement of Profitability

(₹ in lakhs)

	I	II	III
Earnings Before Interest & Tax (50 x 25%)	12.50	12.50	12.50
Less: Interest			
on 14% Deb.	—	2.80	2.10
on 15% Loan	—	1.50	3.75
Earning Before Tax	12.50	8.20	6.65
Less: Tax @ 40%	5.00	3.28	2.66
Earning After Tax	7.50	4.92	3.99
Earning per share (Equity Share of ₹ 10)	1.50	2.46	3.99

Earning per share is maximum in alternative (iii). Therefore, alternative (iii) is better.

Illustration 32. Saryug Times Marketing Ltd. is currently quoted at ₹ 32. The company paid dividend of ₹ 4 per share of ₹ 10. The investor expects a growth rate of 6% p.a.

Compute:

1. Company's cost of Equity Capital.
2. If the anticipated growth rate is 8% p.a., what would be the indicated market price of the share if the dividend of ₹ 4 per share is to be maintained, at the same cost of Equity Capital.
3. If the company's cost of capital is 15% and the anticipated growth rate is 7%. What would be the indicated market price if the dividend would be ₹ 5 per share?

Peace Forever Ltd. has the following capital structure:

	₹ in lakhs
Equity Shares	80
9% 'A' Preference Shares	25
12% Debentures	5.5
Total	160

The market price of the company's equity share is ₹ 40/-. It is expected that the company would next year pay a dividend of ₹ 3 per share on the face value of ₹ 10. The company's growth prospects are 7% per annum. Assuming corporate taxation @ 35%, you are required to:

1. Compute weighted average cost of capital based on the existing capital structure.
2. Compute new weighted average cost of capital if the company raises additional capital of ₹ 50 lakhs as under:

	₹ *in lakhs*
Equity shares	15
10% 'B' Preference Shares	20
12% Debentures	15
Additional Total	50

This would result in increasing the expected dividend to ₹ 3.50 per equity share and leave the growth rate unchanged at 7% but the anticipated market price of the equity shares would fall to ₹ 35/-.

Solution:

$$1.\ Ke = \frac{D_1}{P_0} + g$$

and $D_1 = D_0 (1 + g)$

$D_0 = 4$

$P0 = 32$

$g = 6\% = 0.06$

$D_1 = 4(1 + 0.06) = 4.24$

$$K_e = \frac{4.24}{32} + 0.06$$

$$= 0.1325 + 0.06$$

$$= 0.1925$$

Note: The question mentions that the company paid dividend of ₹ 4 per share, so $D_o = 4$.

If the question mentions that "the company expects to pay dividend of ₹ 4 per share, next year", then $D_1 = 4$.

2. $D_o = 4$, $g = 0.08$, and $K_e = 19.25\%$

$$D_1 = 4(1.08) = 4.32$$

$$K_e = \frac{D_1}{P_o} + g$$

$$0.1925 = \frac{4.32}{P_o} + 0.08$$

$$\frac{4.32}{P_o} + 0.08 = 0.1925$$

$$\frac{4.32}{P_o} = 0.1925 - 0.08$$

$$\frac{4.32}{P_o} = 0.1125$$

$$P_o = \frac{4.32}{0.1125} = 38.40$$

3. $K_e = 0.15$, $g = 0.07$, $D_1 = 5$.

$$K_e = \frac{D_1}{P_o} + g$$

$$0.15 = \frac{5}{P_o} + 0.07$$

$$\frac{5}{P_o} + 0.07 = 0.15$$

$$\frac{5}{P_o} = 0.15 - 0.07$$

$$\frac{5}{P_o} = 0.08$$

$$P_o = \frac{5}{0.08} = 62.50$$

Note: Dividend would be ₹ 5 per share, means that expected dividend for next year would be ₹ 5 per share, so $D_1 = 5$.

(i) $$Ke = \frac{D_1}{P_o} + g$$

$$= \frac{3}{40} + 0.07$$

$$= 0.075 + 0.07 = 0.145$$

$K_p = 9\% = 0.09$

$K_d = (1 - t).I$

$= (1\ 0.35)\ (0.12)$

$= (0.65)\ (0.12) = 0.0780$

$= 7.80\%$

Source	Amount	Cost in %	Interest/Dividend Amount
Equity Shares	80,00,000	14.5%	11,60,000
10% Equity Pref. Shares	25,00,000	9%	2,25,000
12% Debentures	55,00,000	7.8%	4,29,000
	1,60,00,000		18,14,000

$$\text{Weighted Average Cost} = \frac{18,14,000}{160,00,000} \times 100$$

$$= 11.3375\%$$

$$= 11.34\%$$

(ii) $$K_e = \frac{3.5}{35} + 0.07$$

$$= 0.10 + 0.07 = 0.17 = 17\%$$

Kp ('A' Pref. Shares) = 9%

Kp ('B' Pref. Shares) = 10%

Kd = (1 – 0.35) (12%) = 7.8%

Source	Amount ₹	Cost in %	Interest/Dividend Amount ₹
Equity Shares	95,00,000	17%	16,15,000
9% A Preference Shares	25,00,000	9%	2,25,000
10% B Preference Shares	20,00,000	10%	2,00,000
12% Debentures	70,00,000	7.8%	5.46,000
	2,10,00,000		25,86,000

$$\text{Weighted Average Cost} = \frac{25,86,000}{2,10,00,000} \times 100$$

$$= 12.3134\%$$

$$= 12.31\%$$

Illustration 33. The capital structure of Alpha Co. Ltd., comprising 12% debentures, 9% preference shares and equity shares of ₹ 100 each, is in the ratio of 3: 2 : 5.

The company is contemplating introduction of further capital to meet the expansion needs by seeking 14% term loan from financial institution. As a result of this proposal, the proportion of debentures, preference shares and equity shares would get reduced by 1/10, 1/15 and 1/6, respectively. In the light of above proposal, calculate the impact on weighted average cost of capital, assuming 35% tax rate expected dividend ₹ 9 per share at the end of

the year, the growth rate of equity dividend at 5%. No change in the dividend, dividend growth rate and market price of share is expected after availing the proposed term loan.

Solution:

Alpha Co. Ltd.

Before Term Loan

Source	Cost	Proportion	Weighted Cost
Debentures	12% (1 – 0.35) 7.8%	0.3	2.34%
Preference Shares	9%	0.2	1.80%
Equity Shares	14% (9/100 + 0.05)	0.5	7.00%
		1.00	11.14%

After Term Loan

Source	Cost	Proportion	Weighted Cost
Debentures	7.8%	$\frac{3}{10} - \frac{1}{10} = \frac{2}{10} = \frac{6}{30}$	1.56%
Preference Shares	9%	$\frac{2}{10} - \frac{1}{15} = \frac{4}{30}$	1.20%
Equity Shares	14%	$\frac{5}{10} - \frac{1}{6} = \frac{10}{30}$	4.67%
Term Loan	9.1% (1–0.35)	$\frac{10}{30}$	3.03%
		1	10.46%

Because of taking 14% Term loan weighted Average cost of Capital is reduced from 11.14% to 10.46%.

Illustration 34.

1. Big Bang Marketing Ltd. is currently quoted at ₹ 35/-. Next year the company would pay dividend of ₹ 3.50 per share of ₹ 10. The investor expects a growth rate of 5% p.a. Compute:

(i) Company's cost of Equity Capital.

(ii) If the anticipated growth rate is 6% p.a., what would be the indicated market price of the share if the dividend of ₹ 4/- per share is to be declared at the same cost of Equity Capital.

2. Law and Order Ltd. has the following capital structure:

	₹ *in Lakhs*
Equity Shares	25
6% 'A' Preference Shares	35
7% Debentures	30
Total	90

The market price of the company's equity share is ₹ 30/-. It is expected that the company would next year pay a dividend of ₹ 3/- per share on the face value of ₹ 10/-. The company's growth prospects are 4% per annum.

Assuming corporate taxation @ 35% you are required to:

(i) Compute weighted average cost of Capital based on the existing capital structure.

(ii) Compute the new weighted average cost of capital if the company raises additional capital of ₹ 40 lakhs as under:

	₹ *in Lakhs*
Equity Shares	10
7% 'B' Preference Shares	15
9% Debentures	15
Total	40

This would result in increasing the expected dividend to ₹ 4.50 per equity share and leave the growth rate unchanged at 4% but the anticipated market price of the equity shares would fall to ₹ 25/-.

Solution:

1. Big Bank Marketing Ltd.

(i) Cost of Equity Capital $= \left[\frac{\text{Dividend}}{\text{Market Price}} \times 100\right] + \text{Growth Rate}$

$= \left(\frac{3.50}{35} \times 100\right) + 5$

$= 10 + 5$

$= 15\%$

(ii) Cost $= \left[\frac{\text{Dividend}}{\text{Market Price}} \times 100\right] + \text{Growth Rate}$

$15 = \left(\frac{400}{\text{Market Price}}\right) + 6$

$$9 = \left(\frac{400}{\text{Market Price}}\right) \therefore \text{Market Price} = \frac{400}{9}$$

$$= ₹\ 44.44$$

2. Law and Order Ltd.

$$Ke = \left[\frac{\text{Dividend}}{\text{Market Price}} \times 100\right] + \text{Growth Rate}$$

$$\text{Cost of Equity} = \left(\frac{3}{10} \times 100\right) + 4$$

$$= 10 + 4$$

$$= 14\%$$

K_{pa} = 6% = Cost of 'A' Pref. Shares

Kd = Cost of Debentures (After tax)

$$= \frac{65}{100} \times 7$$

$$= 4.55\%$$

Weighted Average Cost of Existing Capital

Type	Capital (₹ in lakhs)	Cost Rate	Weighted Cost (₹ in lakhs)	Weighted Cost
Equity	25	14%	3.50	$\frac{6.965}{90} \times 100$
6% Preference	35	6%	2.10	
7% Debentures	30	4.55%	1.365	= 7.74%
Total	90		6.965	

$$\text{Now } K_p = \left[\frac{\text{Dividend}}{\text{Market Price}} \times 100\right] + \text{Growth Rate}$$

$$= \left(\frac{4.50}{25} \times 100\right) + 4$$

$$= 18 + 4$$

$$= 22\%$$

9% Debentures (After Tax Cost) = 0.65 × 9

$$= 5.85\%$$

Computation of New Weighted Average Cost of Capital

Type	Capital (₹ in lakhs)	Cost Rate	Weighted Cost (₹ in lakhs)
Equity	35	22%	7.70
6% A Preference Shares	35	6%	2.10
7% B Preference Shares	15	7%	1.05
7% Debentures	30	4.55%	1.365
9% Debentures	15	5.85%	0.878
Total	130		13.093

Weighted Average cost of New Capital = $\frac{13,093}{130} \times 100$

= 10.07%

EXERCISE

Self-assessment Questions 1

1. _____ is the mix of long-term sources of funds like debentures, loans, preference shares, equity shares and retained earnings in different ratios.
2. The capital structure of a company should generate _____ to the shareholders.
3. The capital structure of the company should be within the _____.
4. An ideal capital structure should involve _____ to the company.
5. _____ do not have a fixed rate of return on their investment.
6. According to Dividend Forecast Approach, the intrinsic value of an equity share is the sum of _____ associated with it.

Answers to SAQs

Self-assessment Questions 1

1. Capital structure
2. Maximum returns
3. Debt capacity
4. Minimum risk of loss of control
5. Equity shareholders
6. Present values of dividends

Self-assessment Questions 2

State with reasons whether the following statements are True/False.

(a) Debentures and bonds are debt instruments.

(b) Every investment has some risk.

(c) Credit rating helps the investors to make good choice of investment in equity shares

(d) Yield curve considers only the relationship between the maturity and its yield

(e) Interest rate is determined by the RBI

Answers to SAQs

Self-assessment Questions 2

(a) True, (b) True, (c) False, (d) True, (e) False.

Self-assessment Question 3

State with reasons whether the following statements are True or False.

1. Cost of retained earning is separately calculated.
2. Dividend on preference shares is adjusted for taxes to get their cost.
3. Cost of a share is higher if it sells at a premium.
4. Interest on debentures is the basis of ascertaining the cost of equity shares.
5. Debt is cheaper than equity.
6. Cost of new equity and existing equity is the same.
7. All sources of capital have the same cost.
8. Dividend to equity shareholders reduce tax liability.
9. Interest on debentures reduces tax liability.
10. Historical weights are used to calculate WACC.

[**Ans.** True: (4, 5, 9, 10). False: (1, 2, 3, 6, 7, 8)]

Self-assessment Question 4

II. Match the following

Group A	Group B
1. Cost of Capital	(i) cost which has been incurred
2. Historical Cost	(ii) internal rate of return
3. Future Cost	(iii) cost of a specific source of capital
4. Implicit Cost	(iv) weighted average cost of capital
5. Specific Cost	(v) cost of obtaining additional fund
6. Composite Cost	(vi) expected cost
	(vii) important for capital budgeting decisions

[**Ans.** (1-vii), (2-i), (3-vi), (4-ii), (5-iii), (6-iv)]

Self-assessment Question 5

III. Select the correct answer

1. Cost of capital represents
   (i) minimum rate of return.
   (ii) maximum rate of return.
   (iii) average rate of return.
2. Financial decisions are based on
   (i) cost of capital.
   (ii) capital.
   (iii) fixed assets.
3. Cost incurred for financing the project is
   (i) historical cost.
   (ii) future cost.
   (iii) specific cost.
4. Cost of a specific source of capital is
   (i) specific cost.
   (ii) composite cost.
   (iii) historical cost.
5. The cost which equates the PV of cash inflow with the PV of cash outflow is
   (i) explicit cost.
   (ii) historical cost.
   (iii) future cost.
6. Cost of obtaining another rupee of new capital is
   (i) marginal cost.
   (ii) average cost.
   (iii) specific cost.
7. Combined cost of various sources of capital is
   (i) composite cost.
   (ii) marginal cost.
   (iii) specific cost:
8. Cost of equity shares is influenced by
   (i) growth rate of dividend only.
   (ii) growth rate of earning only.
   (iii) both of the above.

9. Cost of preference shares is
   (i) treated for taxes.
   (ii) not treated for taxes.
   (iii) occasionally treated for taxes.

   [**Ans.** (1 - i), (2 - i), (3 - i), (4 - i), (5 - i), (6 - i), (7 - i), (8 - iii), (9 - ii)]

Terminal Questions - 1

1. The following data is available in respect of a company:

   Equity ₹ 10 lakhs, cost of capital 18%

   Debt ₹ 5 lakhs, cost of debt 13%

   Calculate the weighted average cost of funds taking market values as weights assuming tax rate is 40%.

2. Bharat Chemicals has the following capital structure:

₹ 10 face value equity shares	₹ 4,00,000
Term loan @ 13%	₹ 1,50,000
9% Preference shares of ₹ 100, currently traded at ₹ 95 with 6 years maturity period	₹ 1,00,000
Total	₹ 6,50,000

   The company is expected to declare a dividend of ₹ 5 next year and the growth rate of dividends is expected to be 8%. Equity shares are currently traded at ₹ 27 in the market. Assume tax rate of 50%. What is W.A.C.C?

3. The market value of debt of a firm is ₹ 30 lakhs, which of equity is ₹ 60 lakhs. The cost of equity and debt are 15% and 12%. What is the W.A.C.C?

4. A company has 3 divisions – X, Y and Z. Each division has a capital structure with debt, preference shares and equity shares in the ratio 3:4:3 respectively. The company is planning to raise debt, preference shares and equity for all the 3 divisions together. Further, it is planning to take a bank loan @ 12% interest. The preference shares have a face value of ₹ 100, dividend @ 12%, 6 years maturity and currently priced at ₹ 88. Calculate the cost of preference shares and debt if taxes applicable are 45%

5. Tanishk Industries issues partially convertible debentures of face value of is ₹ 100 each and realizes ₹ 96 per share. The debentures are redeemable after 9 years at a premium of 4%, taxes applicable are 40%. What is the cost of debt?

Answers to Terminal Questions

1, 2, 3: $WACC = W_e k_e + W_p k_p + W_r k_r + W_d k_d + W_t k_t$

5. *Hint:* Apply the formula $k_p = \dfrac{D + \{(F - P)/n\}}{(F + P)/2}$

6. *Hint:* Apply the formula $k_d = \dfrac{1(1 - T) + \{(F - P)/n\}}{(F + P)/2}$

6. Bharat Ltd. paid dividend of ₹ 2.50 p.a. in the last yr. Dividends is expected to grow at 10% p.a. for indefinite future. What would be the value of stock if the required rate of return is 15%? Is it worth investing in the share at current market price of ₹ 60?
7. BSES paid ₹ 2.50 as dividend per share on its equity shares for the last year. Dividends are expected to grow at 10 per cent per year for an indefinite future. What is its expected rate of return if its current market price is ₹ 20? If the required rate of return is 12% , what would be the value of stock? Is it worth investing in the share?
8. RIL paid ₹ 3 as dividend per share on its equity shares for last yr. It is expected that it will grow at 10% per yr. for indefinite future.
   (a) What is the expected rate of return if current market price is ₹ 15?
   (b) If the required rate if return is 15%, then what would be the value of stock?
   (c) Is it investing in RIL worth?
9. A debenture of ₹ 10,000 face value carries an interest rate of 9 per cent is redeemable after 7 years at a premium of 5%. If the required rate of return is 12% what should be the present value?
10. A GOI bond of ₹ 1,000 has a coupon rate of 8 % per annum and maturity of 10 years. If the current market price is ₹ 1,015. Find YTM?
11. A Bond of ₹ 1,000 face value carrying an interest rate of ₹ 15 per cent is redeemable after 6 years at a premium of 5 % if the required rate of return is 15 % what is the present value of the bond?
12. A bond of ₹ 1,000 has a coupon rate of 6 per cent per annum and maturity period of 3 years . The bond is currently selling at ₹ 900. what is the yield to maturity in the investment of this bond?
13. A bond of ₹ 1,000 has a coupon rate of 8 p.a. & maturity period of 3 yrs. The bond is currently selling at ₹ 910. What is the yield to maturity in the investment of this bond?
14. A bond of ₹ 1,000 face value carrying an interest rate of ₹ 14 per cent is redeemable after 6yrs. at a premium of 5% if the required rate of return is 15% what is the present value of bond?
15. A Bond of ₹ 1,000 has a coupon Rate of 6 p.a. & maturity period of 3 yr. The bond is currently selling at ₹ 900. What is the yield to maturity in the investment of this bond?
16. Following is the Capital Structure of XCEL Ltd.:

	Amount ₹	**Proportion %**	**Cost %**
Equity shares	18,00,000	30	12
Retained earnings	15,00,000	25	11
Pref. Shares	12,00,000	20	10
Debt	15,00,000	25	5

Calculate Weighted Avg. Cost of Capital

17. S Ltd. Has the following capital structure:

(₹ in Lacs)

Equity	2,00,000 Shares	40.00	20/Share
6% Preference	1,00,000 Share	10.00	10
8% Debentures	3,00,000 Shares	30.00	10

It proposes to borrow loan of ₹ 20.00 lakhs with interest at 10% p.a. The dividend on equity will increase from ₹ 2 to ₹ 3 per share. You are required to ascertain the change in then WACC. Consequent to proposed borrowings.

[**Ans.** Current WACC = 7.25, New WACC = 8.8]

18. A company has on its books the following amounts and specific costs of each type of capital:

Type of Capital	Book Value ₹	Market Value ₹	Specific Cost %
Debt.	4,00,000	3,80,000	5
Preference	1,00,000	1,10,000	8
Equity	6,00,000	12,00,000	13
Retained earnings	2,00,000		9
	13,00,000	**16,90,000**	

Determine the WACC using: (a) B.V. weights, (b) Market value weights

19. Three companies A, B and C are in same type of business and hence have similar operating risks. However, the capital structure of each of them is diff. and the following are the details:

	A	B	C
Equity share capital ₹ (face value ₹ 10 per share)	4,00,000	2,50,000	5,00,000
Market value per share	15	20	12
Dividend per share ₹	-2.70	4	2.88
Debentures ₹ (face value per debenture is ₹ 100)	Nil	1,00,000	2,50,000
Market value per Debenture ₹	—	125	80
Interest rate	—	10%	8%

Assume that the current levels of dividends are generally expected to continue indefinitely and the income-tax rate at 50%.

You are reqd. To compute WACC at market value of each company.

[**Ans.** Company A = WACC-18, Company B = WACC-15.42, Company, C = WACC-17.66]

20. The following info has been extracted from the balance sheet of fashions Ltd.

As on 31st March, 2003

	(₹ in lakhs)
12% debentures	400
Eq. Shares	400
Term loan (interest 18%)	1,200
	2,000

(a) Determine the WACC of the company. It had been paying dividends at a consistent rate of 20% p.s.

(b) What difference will it make if the current price of equity share of the ₹ 100 share is ₹ 160?

Whenever income tax rate is not given assume 50%.

[**Ans.** Current WACC = 10.6, New WACC = 9.1]

21. Computation of cost of equity capital, cost of debentures, cost of preference share and weighted avg. Cost of capital. You are required to determine the WACC (Ko) of the K.C. Ltd. Using: (a) B.V. weights, and (b) Market value weights.

The foll information is available for you perusal.

The K.C. Ltd's present book value capital structure is:

	₹
Debentures (₹ 100 per debenture)	8,00,000
Equity Shares (₹ 10 per share)	10,00,000
Preference Shares (₹ 100 per share)	2,00,000
	20,00,000

All these securities are trade in the capital markets. Recent prices are debentures @ ₹ 110, pref. shares @ ₹ 120 and eq. Shares @ ₹ 22. Anticipated external financing opportunities are:

(a) ₹ 100 per debenture redeemable at par: 20-yr maturity, 8% interest rate, 4% flotation cost, sale price ₹ 100

(b) ₹ 100 pref. Sh redeemable at par: 15-yr maturity, 10% dividend rate, 5% flotation cost, sale price ₹ 100

(c) Eq. Shares ₹ 2 per sh. Flotation costs, sales price ₹ 22.

In addition, the dividend expected on the equity share at the end of the year ₹ 2 per share: the anticipated growth rate in dividends is 5% and the compant has the practice of paying all its earning in the form of dividends. The corporate tax is 50%.

[**Ans.** Book Value-Ke = 15%, Kd = 4.18, Kp = 10.59, WACC = 10.23, Market Value WACC = 11.81]

22. From the foll. capital structures of a Ltd., Co. You are reqd. to calculate over all cost of capital using:

(a) B.V. weights and

(b) Market value weights

Source	Book Value ₹	Market Value (₹)
Eq. Sh. Capital (₹ 10 shares)	45,000	90,000
Retained Earnings	15,000	—
Pref. Sh. Capital	10,000	10,000
Debentures	30,000	30,000

The after tax cost of diff. Source is as follows:

Eq. Sh. Capital	14%
Retained earnings	13%
Pref. Sh. Capital	10%
Debentures	5%

23. The capital structure of H Ltd. as on 31st Dec. 2002 is as follows:

Eq. Sh. Capital: 10 lakhs of shares of ₹ 10 each. = ₹ 1 crore

Reserves = ₹ 20 lakhs

14% debentures of ₹ 100 each = ₹ 30 lakhs

For the year ended 31st December, 2002, the company has paid equity dividend at 20%. As the company is a market leader with good future, dividend is likely to grow by 5% every year. The equity shares are now traded at ₹ 80 per share in the stock exchange. Income tax rate is applicable to the company is 40%. You are reqd. To calculate:

(a) The current WACC

(b) The Company has plans to raise a further ₹ 50 lakhs by way of long-term loan at 15% interest. When this takes place, the market value of the equity shares is expected to fall to ₹ 50 per share. What will be the new WACC of the company?

24. Calculate the weighted avg. cost of capital from the foll. Data of Blazing Arrow Co. Ltd. Ignore taxation.

	₹
7% Debentures	1,30,000
8% Pref. Shares	70,000
Eq. Shares (of ₹ 100 fv)	6,00,000
	8,00,000

(There are no retained profits or securities premium)

A dividend of 10% a yr. has been paid on the eq. shares in recent years. All of the company's securities are quoted on the local stock exchange. The prices of these securities have recently been at par (i.e. market or issue price same).

25. The Aaroha company has the following capital structure:

	₹
Common Shares (4,00,000 Sh.)	80,00,000
6% Pref. Sh.	20,00,000
8% Deb.	60,00,000
	1,60,00,000

The share of the Co. sells at ₹ 20. It is expected that the company will pay next year a dividend of ₹ 2 per. sh. which will grow at 7%. Assume a 35% tax rate.

(a) Compute a weighted avg. cost of capital based on existing capital structure.

(b) Compute the new weighted avg. Cost of capital if the co. Raises an additional ₹ 40,00,000 debt by issuing 10% deb. This would result in increasing the expected dividend to ₹ 3 and leave growt rate unchanged, but the price of share will fall at ₹ 15 per sh. [**Ans.** Current WACC = 11.2, New WACC = 14.26]

26. Present Glory Co. Ltd. Is considering raising funds of about ₹ 400 lakhs by one of two alternative methods, viz, 16% institutional term loan and 13% non-convertible debentures, the term option would attract no major incidental cost. The debentures would have to be issued at a disc. Of 2.5% and would involve cost of issue of ₹ 2 lacs. Advise the co. As to better option based on the effective cost of capital in each case. Assume tax rate of 50%.

27. The following is the capital structure of Sweeping Success Co. Ltd.

	₹	Proportion
Eq. Sh. Capital	4,50,000	45%
Retained Earning	1,00,000	10%
Pref. Sh. Capital	1,00,000	10%
Term Loan	3,50,000	35%
	10,00,000	**100%**

The firms after tax component costs of the various sources of finance are as follows:

Source	Cost
Eq. Capital	15%
Retained Earnings	13%
Preference Capital	11%
Term Loan	75%

You are reqd. to calculate weighted avg. cost of capital of the firm.

28. G. Ltd., has the following capital structures as on 31st March 2002.

	₹
Ordinary shares	80,00,000
10% Pref. Shares	20,00,000
14% Debentures	60,00,000

The shares of the company are presently selling at ₹ 20 per sh. It is expected that the co. will pay next yr. dividend of ₹ 2 per sh. which will grow @ 7%. Assume tax rate of 40%. You are reqd. to:

(a) Compute the weighted avg. cost of capital based on existing capital structure.

(b) If the company raises an additional ₹ 40 lakhs debt by issuing 15% debentures, the expected dividend at year end will be ₹ 3, the market price per share will fall to ₹ 15 per share, the growth rate remaining unchanged. Calculate the new weighted avg. cost of capital.

29. Calculate the marginal cost of capital from the foll:

	₹ lakhs
Equity Capital	400
Internal Generation	200
12% Pref. Shares	100
13% Debentures	800
12% Cash cr. from Banks	700
Current Liabilities	300
	2,500

The required after tax rate of return on equity is 18% and on internal cash generation is 15%. The tax rate is 40%.

30. EXE Ltd., has the following capital structure as an 31st March, 2000.

	₹
10% debentures	3,00,000
9% pref. Shares	2,00,000
Eq. Shares of ₹ 100 each	5,00,000
Total	**10,00,000**

The eq. shares of the Co. are quoted at ₹ 102 and the Co. is expected to declare a dividend of ₹ 9 per share for the year.

Required:

(a) Assuming the tax rate applicable to the Co. to be 50%, calculate the cost of capital. State clearly the assumptions you make.

(b) Assuming that the company can raise additional term loan at 12% for ₹ 5,00,000 to finance an expansion, calculate the revised weighted cost of capital. The company's assessment is that it will be in a position to increase the dividend from ₹ 9 per sh. to ₹ 10 per sh., but the business risk associated with new financing may bring down the market price from ₹ 102 to ₹ 96 per sh.

31. From the following capital structure of Perfect Ltd. calculate overall cost of capital, using: (a) book value weights and (b) market value weights.

	Book Value	Market Value
Equity capital	4,50,000	9,00,000
Retained earnings	1,50,000	-
Pref. Share capital	1,00,000	1,00,000
Debentures	3,00,000	3,00,000

The after tax cost of different sources of finance are equity share capital 14%, retained earnings 13%, pref. shares 10% and debentures 5%.

31. Hopeful Ltd. issues 50,000 8% Debentures of ₹ 1 each at a premium of 10%. The cost of flotation is 2%. The rate of tax is 60%.

Calculate the cost of debentures. [**Ans.** 2.96%]

32. Faithful Ltd. issues 5000 12% Debentures of ₹ 100 each at a discount of 5%. The commission payable to underwriter and brokers is ₹ 25000. The debentures are redeemable after 5 years. Tax rate is 50%.

Calculate after tax cost of debentures. [**Ans.** 7.36%]

33. Delightful Ltd. issues 1000 10% preference shares of ₹ 100 each at a discount of 5%. Cost of raising capital is ₹ 2,000.

Calculate cost of preference share capital. [**Ans.** 10.75%]

34. Jolly Ltd.'s share is quoted in the market at ₹ 20. The company pays a dividend of Re. 1 per share. The investors expect a growth rate of 5% per year.

Compute the cost of equity capital. [**Ans.** 10%]

35. X Ltd has the following capital structure:

Equity Shares (200000 Shares)	₹ 40,00,000
8% Preference Shares	₹ 10,00,000
8% Debentures	₹ 30.00,000
	₹ 80,00,000

The shares of the company sell for ₹ 20. It is expected that the company will pay next year a dividend of ₹ 2 per share which will grow to 7% for ever. Assume tax rate of 50%.

Calculate the weighted average.

Cost of capital based on the existing capital structure. [**Ans.** 10.75%]

36. M/s Chitra Gupta Ltd. provides you the following specific cost of capital along with indicated B.V. and M.V. weights.

Capital Type	Cost	Weights	
		B.V.	M.V.
Equity Shares	18%	0.5	0.58
15% Preference Shares	?	0.2	0.17
14% Debentures	?	0.3	0.25

(a) Calculate the weighted average cost of capital using Book Value and Market Value Weights.

(b) Calculate the weighted average cost of capital if the company intended to raise the needed funds using 50% long term debt 15% through equity shares and retained earnings and balance by way of preference shares. Assume tax at 50%.

[**Ans.** (a) 14.1%; 14.7%. (b) 11.45%]

37. Jigna Ltd. issues 10% redeemable debentures of ₹ 1,00,000. The company is in 55% tax bracket.

Calculate cost of debt before and after tax if the debentures are issued at par, at 10% discount and at 10% premium.

[**Ans.** At par 4.5%. At discount 5%. At premium 4.1%]

38. Excel Industries has assets of ₹ 1,60,000 which have been financed with ₹ 52,000 of debt and ₹ 90,000 of equity and a general reserve of ₹ 18,000. The firm's total profits after interest and taxes for the year ended 31st March, 2002 were ₹ 13,500. It pays 8% interest on borrowed funds and is in 50% tax bracket. It has 900 equity shares of ₹ 100 each selling at a market price of ₹ 120 per share.

What is the weighted average cost of capital.

[**Ans.** Cost of debt 4%. Cost of equity 12.5%. Weighted average cost of capital 9.74%]

39. M Ltd. is a dynamic growth firm which pays no dividends, anticipates a long run level of future earning of ₹ 7 per share. The current price of M Ltd.'s shares is ₹ 55.45, floating cost for the sales of equity shares would average about 10% of the price of the shares.

What is the cost of new equity capital of M. Ltd. [**Ans.** 14.03%]

40. Shruti Ltd. has the following capital structure:

Equity Capital	₹ 10,00,000
10% Preference Share Capital	₹ 5,00,000
8% Bank Loan	₹ 15,00,000

You are required to calculate the weighted average cost of capital assuming 50% as the rate of income tax, before and after tax.

[**Ans.** Before tax 9.66%, after tax 7.67%]

41. The following items have been extracted from the Balance Sheet of Sujan Ltd. as on 31st December, 2008:

4,00,000 Equity Shares of ₹ 10 each	₹ 40,00,000
Reserves and Surplus	₹ 60,000
15% Debentures	₹ 20,00,000
14% IDBI Loans	₹ 60,00,000

Other Information:

Year ended 31st December	Dividend per Share ₹	Earnings per Share ₹	Average Market Price per Share ₹
2006	4	7.50	50
2007	3	6.00	40
2008	4	4.50	30

Calculate weighted average cost of capital using book values as weights and earning price ratio as the basis of cost of equity. Assume 50% tax rate. [**Ans.** 11.5%]

42. A firm has the following structure and after tax cost for different sources of funds:

Sources of Funds	Amount ₹	Proportion %	After Tax Cost %
Debts	15,00,000	25	5
Preference Share Capital	12,00,000	20	10
Equity Share Capital	18,00,000	30	12
Retained Earnings	15.00000	25	11
	60,00,000	100	

Calculate weighted average cost of capital. [**Ans.** 9.60%]

43. The equity of SG Ltd. are traded in the market at ₹ 90 each. The current year dividend per share is ₹ 18. The growth expected in dividend is at 6%.

Calculate the cost of equity capital. [**Ans.** 26%]

44. Ambuja Cements Ltd. has the following capital structure:

	Market Value ₹	Book Value ₹	Cost %
Equity Share Capital	80	120	18
Preference Share Capital	30	20	15
Fully Secured Debentures	40	40	14

Calculate weighted average cost of capital.

[**Ans**. Based on Market Value: 16.33%. Based on Book Value: 16.78%]

45. Zed Ltd. is presently financed entirely by equity shares. The current market value is ₹ 6,00,000. A dividend of ₹ 1,20,000 has just been paid. This level of dividend is expected to be paid indefinitely. The company is thinking of investing in a new project involving an outlay of ₹ 5,00,000 now and is expected to generate net cash receipts of ₹ 1,05,000 p.a. indefinitely. The project would be financed by issuing ₹ 5,00,000 debentures at the market interest rate of 18%. Ignore taxation.

    Calculate the value of equity shares and the gain made if the cost of equity raises to 21.6% and also calculate weighted average cost of capital. [**Ans.** 20%]

Terminal Questions 2

1. (a) What is Cost of Capital?
   (b) What is the importance of Cost of Capital?
2. How would you classify Cost of Capital?
3. How would you calculate specific Cost of Sources of Finance?
4. What do you mean by Weighted Average Cost of Capital? What is the procedure of calculation of Weighted Average Cost of Capital?

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APPENDIX

Appendix 1: Future Value Interest Factor (FVIF)

$FVIF\ (r, n) = (1 + r)^n$

Period n	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%
0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1	1.010	1.020	1.030	1.040	1.050	1.060	1.070	1.080	1.090	1.100	1.110	1.120	1.130
2	1.020	1.040	1.061	1.082	1.102	1.124	1.145	1.166	1.188	1.210	1.232	1.254	1.277
3	1.030	1.061	1.093	1.125	1.158	1.191	1.225	1.260	1.295	1.331	1.368	1.405	1.443
4	1.041	1.082	1.126	1.170	1.216	1.262	1.311	1.360	1.412	1.464	1.518	1.574	1.630
5	1.051	1.104	1.159	1.217	1.276	1.338	1.403	1.469	1.539	1.611	1.685	1.762	1.842
6	1.062	1.126	1.194	1.265	1.340	1.419	1.501	1.587	1.677	1.772	1.870	1.974	2.082
7	1.072	1.149	1.230	1.316	1.407	1.504	1.606	1.714	1.828	1.949	2.076	2.211	2.353
8	1.083	1.172	1.267	1.369	1.477	1.594	1.718	1.851	1.993	2.144	2.305	2.476	2.658
9	1.094	1.195	1.305	1.423	1.551	1.689	1.838	1.999	2.172	2.358	2.558	2.773	3.004
10	1.105	1.219	1.344	1.480	1.629	1.791	1.967	2.159	2.367	2.594	2.839	3.106	3.395
11	1.116	1.243	1.384	1.539	1.710	1.898	2.105	2.332	2.580	2.853	3.152	3.479	3.836
12	1.127	1.268	1.426	1.601	1.796	2.012	2.252	2.518	2.813	3.138	3.498	3.896	4.335
13	1.138	1.294	1.469	1.665	1.886	2.133	2.410	2.720	3.066	3.452	3.883	4.363	4.898
14	1.149	1.319	1.513	1.732	1.980	2.261	2.579	2.937	3.342	3.797	4.310	4.887	5.535
15	1.161	1.346	1.558	1.801	2.079	2.397	2.759	3.172	3.642	4.177	4.785	5.474	6.254
16	1.173	1.373	1.605	1.873	2.183	2.540	2.952	3.426	3.970	4.595	5.311	6.130	7.067
17	1.184	1.400	1.653	1.948	2.292	2.693	3.159	3.700	4.328	5.054	5.895	6.866	7.986
18	1.196	1.428	1.702	2.026	2.407	2.854	3.380	3.996	4.717	5.560	6.544	7.690	9.024
19	1.208	1.457	1.754	2.107	2.527	3.026	3.617	4.316	5.142	6.116	7.263	8.613	10.197
20	1.220	1.486	1.806	2.191	2.653	3.207	3.870	4.661	5.604	6.728	8.062	9.646	11.523
25	1.282	1.641	2.094	2.666	3.386	4.292	5.427	6.848	8.623	10.835	13.585	17.000	21.231
30	1.348	1.811	2.427	3.243	4.322	5.743	7.612	10.063	13.268	17.449	22.892	29.960	39.116

Appendix 1 *((contd.)*

Period n	14%	15%	16%	17%	18%	19%	20%	24%	28%	32%	36%	40%
0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1	1.140	1.150	1.160	1.170	1.180	1.190	1.200	1.240	1.280	1.320	1.360	1.400
2	1.300	1.322	1.346	1.369	1.392	1.416	1.440	1.538	1.638	1.742	1.850	1.960
3	1.482	1.521	1.561	1.602	1.643	1.685	1.728	1.907	2.097	2.300	2.515	2.744
4	1.689	1.749	1.811	1.874	1.939	2.005	2.074	2.364	2.684	3.036	3.421	3.842
5	1.925	2.011	2.100	2.192	2.288	2.386	2.488	2.392	3.436	4.007	4.653	5.378
6	2.195	2.313	2.436	2.565	2.700	2.840	2.986	3.635	4.398	5.290	6.328	7.530
7	2.502	2.660	2.826	3.001	3.185	3.379	3.583	4.508	5.629	6.983	8.605	10.541
8	2.853	3.059	3.278	3.511	3.759	4.021	4.300	5.590	7.206	9.217	11.703	14.758
9	3.252	3.518	3.803	4.108	4.435	4.785	5.160	6.931	9.223	12166	15.917	20.661
10	3.707	4.046	4.411	4.807	5.234	5.695	6.192	8.549	11.806	16.060	21.647	28.925
11	4.226	4.652	5.117	5.624	6.176	6.777	7.430	10.657	15.112	21.199	29.439	40.496
12	4.818	5.350	5.936	6.580	1.288	8.064	8.916	13.215	19.343	27.983	40.037	56.694
13	5.492	6.153	6.886	7.699	8.599	9.596	10.699	16.386	24.159	36.937	54.451	79.372
14	6.261	7.076	7.988	9.007	10.141	11.420	12.839	20.319	31.961	48.751	74.053	111.120
15	7.138	8.137	9.266	10.539	11.974	13.590	15.407	25.196	40.565	64.359	100.712	155.568
16	8.137	9.358	10.748	12.330	14.129	16.172	18.488	31.243	51.923	84.954	136.969	217.795
17	9.276	10.761	12468	14.426	16.672	19.244	22186	38.741	66.461	112.139	186.278	304.914
18	10.575	12.375	14.463	16.879	19.673	22901	26.623	48.039	85.071	148.023	253.388	426.879
19	12056	14.263	16.777	19.748	23.214	27.252	31.948	59.568	108.890	195.391	344.540	597.630
20	13.743	16.367	19.461	23.106	27.393	32.429	38.338	73.864	139.380	257.916	468.574	836.683
25	26.462	32.919	40.874	50.658	62.669	77.388	95.396	216.542	478.905	1033.590	2180.081	4499.880
30	50.950	66.212	85.850	111.065	143.371	184.675	237.376	634.820	1645.504	4142075	10143.019	24201.43

Appendix 2: Future Value Interest Factor for an Annuity (FVIFA) $FVIFA\ (r, n) = \frac{(1+r)n-1}{r}$

Period n	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2	2.010	2.020	2.030	2.040	2.050	2.060	2.070	2.080	2.090	2.100	2.110	2.120	2.130
3	3.030	3.060	3.091	3.122	3.152	3.184	3.215	3.246	3.278	3.310	3.342	3.374	3.407
4	4.060	4.122	4.184	4.246	4.310	4.375	4.440	4.506	4.573	4.641	4.710	4.779	4.850
5	5.101	5.204	5.309	5.416	5.526	5.637	5.751	5.867	5.985	6.105	6.228	6.353	6.480
6	6.152	6.308	6.468	6.633	6.802	6.975	7.153	7.336	7.523	7.716	7.913	8.115	8.323
7	7.214	7.434	7.662	7.898	8.142	8.394	8.654	8.923	9.200	9.487	9.783	10.089	10.405
8	8.286	8.583	8.892	9.214	9.549	9.897	10.260	10.637	11.028	11.436	11.859	12.300	12.757
9	9.369	9.755	10.159	10.583	11.027	11.491	11.978	12.488	13.021	13.579	14.164	14.776	15.416
10	10.462	10.950	11.464	12.006	12.578	13.181	13.816	14.487	15.193	15.937	16.722	17.549	18.420
11	11.567	12.169	12.808	13.486	14.207	14.972	15.784	16.645	17.560	18.531	19.561	20.655	21.814
12	12.683	13.412	14.192	15;026	15.917	16.870	17.888	18.977	20.141	21.384	22.713	24.133	25.650
13	13.809	14.680	15.618	16.627	17.713	18.882	20.141	21.495	22.953	24.523	26.212	28.029	29.985
14	14.947	15.974	17.086	18.292	19.599	21.015	22.550	24.215	26.019	27.975	30.095	32.393	34.883
15	16.097	17.293	18.599	20.024	21.579	23.276	25.129	27.152	29.361	31.772	34.405	37.280	40.417
16	17.258	18.639	20.157	21.825	23.657	25.673	27.888	30.324	33.003	35.950	39.190	42.753	46.672
17	18.430	20.012	21.762	23.698	25.840	28.813	30.840	33.750	36.974	40.545	44.501	48.884	53.739
18	19.615	21.412	23.414	25.645	28.132	30.906	33.999	37.450	41.301	45.599	50.396	55.750	61.725
19	20.811	22.841	25.117	27.671	30.539	33.760	37.379	41.446	46.018	51.159	56.939	63.440	70.749
20	22.019	24.297	26.870	29.778	33.066	36.786	40.995	45.762	51.160	57.275	64.203	72.052	80.947
25	28.243	32.030	36.459	41.646	47.727	54.865	63.249	73.106	84.701	98.347	114.413	133.334	155.620
30	34.785	40.568	47.575	56.805	66.439	79.058	94.461	113.283	136.308	164.494	199.021	241.333	293.199

Appendix 2 *((contd.)*

Period n	14%	15%	16%	17%	18%	19%	20%	24%	28%	32%	36%	40%
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2	2.140	2.150	2.160	2.170	2.180	2.190	2.200	2.240	2.280	2.320	2.360	2.400
3	3.440	3.473	3.S06	3.539	3.572	3.606	3.640	3.778	3.918	4.062	4.210	4.360
4	4.921	4.993	5.066	5.141	5.215	5.291	5.368	5.684	6.016	6.362	6.725	7.104
5	6.610	6.742	6.877	7.014	7.154	7.297	7.442	8.048	8.700	9.398	10.146	10.946
6	8.536	8.754	8.977	9.207	9.442	9.683	9.930	10.980	12.136	13.406	14.799	16.324
7	10.730	11.067	11.414	11.772	12.142	12.523	12.916	14.615	16.534	18.696	21.126	23.853
8	13.233	13.727	14.240	14.773	15.327	15.902	16.499	19.123	22.163	25.678	29.732	34.395
9	16.085	16786	17.518	18.285	19.086	19.923	20.799	24.712	29.369	34.895	41.435	49.153
10	19.337	20.304	21.321	22.393	23.521	24.709	25.959	31.643	38.592	47.062	57.352	69.814
11	23.044	24.349	25.733	27.200	28.755	30.404	32.150	40.238	50.399	63.122	78.998	98.739
12	27.271	29.002	30.850	32.824	34.931	37.180	39.580	50.985	65.510	84.320	108.437	139.235
13	32.089	34.352	36.786	39.404	42.219	45.244	48.497	64.110	84.853	112.303	148.475	195.929
14	37.518	40.505	43.672	47.103	50.818	54.841	59.196	80.496	109.612	149.240	202.926	275.300
15	43.842	47.580	51.660	56.110	60.965	66.261	72.035	100.815	141.303	197.997	276.979	386.420
16	50.980	55.717	60.925	66.649	72.939	79.850	87.442	126.011	181.868	262.356	377.692	541.988
17	59.118	65.075	71.673	78.979	87.068	96.022	105.931	157.253	233.791	347.310	514.661	759.784
18	68.394	75.836	84.141	93.406	103.740	115.266	128.117	195.994	300.252	459.449	700.939	1064.697
19	78.969	88.212	98.603	110.285	123.414	138.166	154.740	244.033	385.323	607.472	954.277	1491.576
20	91.025	102.440	115.380	130.033	146.628	165.418	186.688	303.601	494.213	802.863	1298.817	2089.206
25	181.871	212.793	249.214	292.105	342.603	402.042	471.981	898.092	1706.803	3226.844	6053.004	11247.199
30	356.787	434.745	530.321	647.439	790.948	966.712	1181.882	2640.916	5873.231	12940.859	28172.276	60501.081

Appendix 3: Present Value Interest Factor (FVIF)

$PVIF\ (r, n) = (1 + r)^{-n}$

Period *n*	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%
0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909	0.901	0.893	0.885
2	0.980	0.961	0.943	0.925	0.907	0.890	0.873	0.857	0.842	0.826	0.812	0.797	0.783
3	0.971	0.924	0.915	0.889	0.864	0.840	0.816	0.794	0.772	0.751	0.731	0.712	0.693
4	0.961	0.924	0.889	0.855	0.823	0.792	0.763	0.735	0.708	0.683	0.659	0.636	0.613
5	0.951	0.906	0.863	0.822	0.784	0.747	0.713	0.681	0.650	0.621	0.593	0.567	0.543
6	0.942	0.888	0.838	0.790	0.746	0.705	0.666	0.630	0.596	0.564	0.535	0.507	0.480
7	0.933	0.871	0.813	0.760	0.711	0.665	0.623	0.583	0.547	.0.513	0.482	0.452	0.425
8	0.923	0.853	0.789	0.731	0.677	0.627	0.582	0.540	0.502	0.467	0.434	0.404	0.376
9	0.914	0.837	0.766	0.703	0.645	0.592	0.544	0.500	0.460	0.424	0.391	0.361	0.333
10	0.905	0.820	0.744	0.676	0.614	0.558	0.508	0.463	0.422	0.386	0.352	0.322	0.295
11	0.896	0.804	0.722	0.650	0.585	0.527	0.475	0.429	0.388	0.350	0.317	0.287	0.261
12	0.887	0.788	0.701	0.625	0.557	0.497	0.444	0.397	0.356	0.319	0.286	0.257	0.231
13	0.879	0.773	0.681	0.601	0.530	0.469	0.415	0.368	0.326	0.290	0.258	0.229	0.204
14	0.870	0.758	0.661	0.577	0.505	0.442	0.388	0.340	0.299	0.263	0.232	0.205	0.181
15	0.861	0.743	0.642	0.555	0.481	0.417	0.362	0.315	0.275	0.239	0.209	0.183	0.160
16	0.853	0.728	0.623	0.534	0.458	0.394	0.339	0.292	0.252	0.218	0.188	0.163	0.141
17	0.844	0.714	0.605	0.513	0.436	0.377	0.311	0.270	0.231	0.198	0.170	0.146	0.125
18	0.836	0.700	0.587	0.494	0.416	0.350	0.296	0.250	0.212	0.180	0.153	0.130	0.111
19	0.828	0.686	0.570	0.475	0.396	0.331	0.276	0.232	0.194	0.164	0.138	0.116	0.098
20	0.820	0.673	0.554	0.456	0.377	0.312	0.258	0.215	0.178	0.149	0.124	0.104	0.087
25	0.780	0.610	0.478	0.375	0.295	0.233	0.184	0.146	0.116	0.092	0.074	0.059	0.047
30	0.742	0.552	0.412	0.308	0.231	0.174	0.131	0.099	0.075	0.057	0.044	0.033	0.026

Appendix 3 *(contd.)*

Period *n*	14%	15%	16%	17%	18%	19%	20%	24%	28%	32%	36%	40%
0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1	0.877	0.870	0.862	0.855	0.847	0.840	0.833	0.806	0.781	0.758	0.735	0.714
2	0.769	0.756	0.743	0.731	0.718	0.706	0.694	0.650	0.610	0.574	0.541	0.510
3	0.675	0.658	0.641	0.624	0.609	0.593	0.579	0.524	0.477	0.435	0.398	0.364
4	0.592	0.572	0.552	0.534	0.516	0.499	0.482	0.423	0.373	0.329	0.292	0.260
5	0.519	0.497	0.476	0.456	0.437	0.419	0.402	0.341	0.291	0.250	0.215	0.186
6	0.456	0.432	0.410	0.390	0.370	0.352	0.335	0.275	0.227	0.189	0.158	0.133
7	0.400	0.376	0.354	0.333	0.314	0.296	0.279	0.222	0.178	0.143	0.116	0.095
8	0.351	0.327	0.305	0.285	0.266	0.249	0.233	0.179	0.139	0.108	0.085	0.068
9	0.308	0.284	0.263	0.243	0.226	0.209	0.194	0.144	0.108	0.082	0.063	0.048
10	0.270	0.247	0.227	0.208	0.191	0.176	0.162	0.116	0.085	0.062	0.046	0.035
11	0.237	0.215	0.195	0.178	0.162	0.148	0.135	0.094	0.066	0.047	0.034	0.025
12	0.208	0.187	0.168	0.152	0.137	0.124	0.112	0.076	0.052	0.036	0.025	0.618
13	0.182	0.163	0.145	0.130	0.116	0.104	0.093	0.061	0.040	0.027	0.018	0.013
14	0.160	0.141	0.125	0.111	0.099	0.088	0.078	0.049	0.032	0.021	0.014	0.009
15	0.140	0.123	0.108	0.095	0.084	0.074	0.065	0.040	0.025	0.016	0.010	0.006
16	0.123	0.107	0.093	0.081	0.071	0.062	0.054	0.032	0.019	0.012	0.007	0.005
17	0.108	0.093	0.080	0.069	0.060	0.052	0.045	0.026	0.015	0.009	0.005	0.003
18	0.095	0.081	0.069	0.059	0.051	0.044	0.038	0.021	0.012	0.007	0.004	0.002
19	0.083	0.070	0.060	0.051	0.043	0.037	0.031	0.017	0.009	0.005	0.003	0.002
20	0.073	0.061	0.051	0.043	0.037	0.031	0.026	0.014	0.007	0.004	0.002	0.001
25	0.038	0.030	0.024	0.020	0.016	0.013	0.010	0.005	0.002	0.001	0.000	0.000
30	0.020	0.015	0.012	0.009	0.007	0.005	0.004	0.002	0.001	0.000	0.000	0.000

Appendix 4: Present Value Interest Factor for an Annuity (PVIFA) $PVIFA\ (r, n) = 1 - \frac{1/(1+r)n}{r}$

Period n	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%
0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909	0.901	0.893	0.885
2	1.970	1.942	1.913	1.886	1.859	1.833	1.808	1.783	1.759	1.736	1.713	1.690	1.668
3	2.941	2.884	2.829	2.775	2.723	2.673	2.624	2.577	2.531	2.487	2.444	2.402	2.361
4	3.902	3.808	3.717	3.630	3.546	3.465	3.387	3.312	3.240	3.170	3.102	3.037	2.974
5	4.853	4.713	4.580	4.452	4.329	4.212	4.100	3.993	3.890	3.791	3.696	3.605	3.517
6	5.795	5.601	5.417	5.242	5.076	4.917	4.766	4.623	4.486	4.355	4.231	4.111	3.998
7	6.728	6.472	6.230	6.002	5.786	5.582	5.389	5.206	5.033	4.868·	4.712	4.56:4	4.423
8	7.652	7.325	7.020	6.733	6.463	6.210	5.971	5.747	5.535	5.335	5.146	4.968	4.799
9	8.566	8.162	7.786	7.435	7.108	6.802	6.515	6.247	5.995	5.759	5.537	5.328	5.132
10	9.471	8.983	8.530	8.111	7.722	7.360	7.024	6.710	6.418	6.145	5.889	5.650	5.426
11	10.368	9.787	9.253	8.760	8.306	7.887	7.499	7.139	6.805	6.495	6.207	5.938	5.687
12	11.255	10.575	9.945	9.385	8.863	8.384	7.943	7.536	7.161	6.814	6.492	6.194	5.918
13	12.134	11.348	10.635	9.986	9.394	8.853	8.358	7.904	7.487	7.103	6.750	6.424	6.122
14	13.004	12.106	11.296	10.563	9.899	9.295	8.745	8.244	7.786	7.367	6.982	6.628	6.302
15	13.865	12.849	11.938	11.118	10.380	9.712	9.108	8.559	8.060	7.606	7.191	6.811	6.462
16	14.718	13.578	12.561	11.652	10.838	10.106	9.447	8.851	8.312	7.824	7.379	6.974	6.604
17	15.562	14.292	13.166	12.166	11.274	10.477	9.763	9.122	8.544	8.022	7.549	7.120	6.729
18	16.398	14.992	13.754	12.659	11.690	10.828	10.059	9.372	8.756	8.201	7.702	7.250	6.840
19	17.226	15.678	14.324	13.134	12.085	11.158	10.336	9.604	8.950	8.365	7.839	7.366	6.938
20	18.046	16.351	14.877	13.590	12.462	11.470	10594	9.818	9.128	8.514	7.963	7.469	7.025
25	22.023	19.523	17.413	15.622	14.094	12.783	11.654	10.675	9.823	9.077	8.422	7.843	7.330
30	25.808	22.397	19.600	17.292	15.373	13.765	12.409	11.258	10.274	9.427	8.694	8.055	7.496

Appendix 4 *(contd.)*

Period n	14%	15%	16%	17%	18%	19%	20%	24%	28%	32%	36%	40%
0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1	0.877	0.870	0.862	0.855	0.847	0.840	0.833	0.806	0.781	0.758	0.735	0.714
2	1.647	1.626	1.605	1.585	1.566	1.547	1.528	1.457	1.392	1.332	1.276	1.224
3	2.322	2.283	2.246	2.210	2.174	2.140	2.106	1.981	1.868	1.766	1.674	1.589
4	2.914	2.855	2.798	2.743	2.690	2.639	2.589	2.404	2.241	2.096	1.966	1.849
5	3.433	3.352	3.274	3.199	3.127	3.058	2.991	2.745	2.532	2.345	2.181	2.035
6	3.889	3.784	3.685	3.589	3.498	3.410	3.326	3.020	2.759	2.534	2.339	2.168
7	4.288	4.160	4.039	3.922	3.812	3.706	3.605	3.242	2.937	2.678	2.455	2.263
8	4.639	4.487	4.344	4.207	4.078	3.954	3.837	3.421	3.076	2.786	2.540	2.331
9	4.946	4.772	4.607	4.451	4.303	4.163	4.031	3.566	3.184	2.868	2.603	2.379
10	5.216	5.019	4.883	4.659	4.494	4339	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