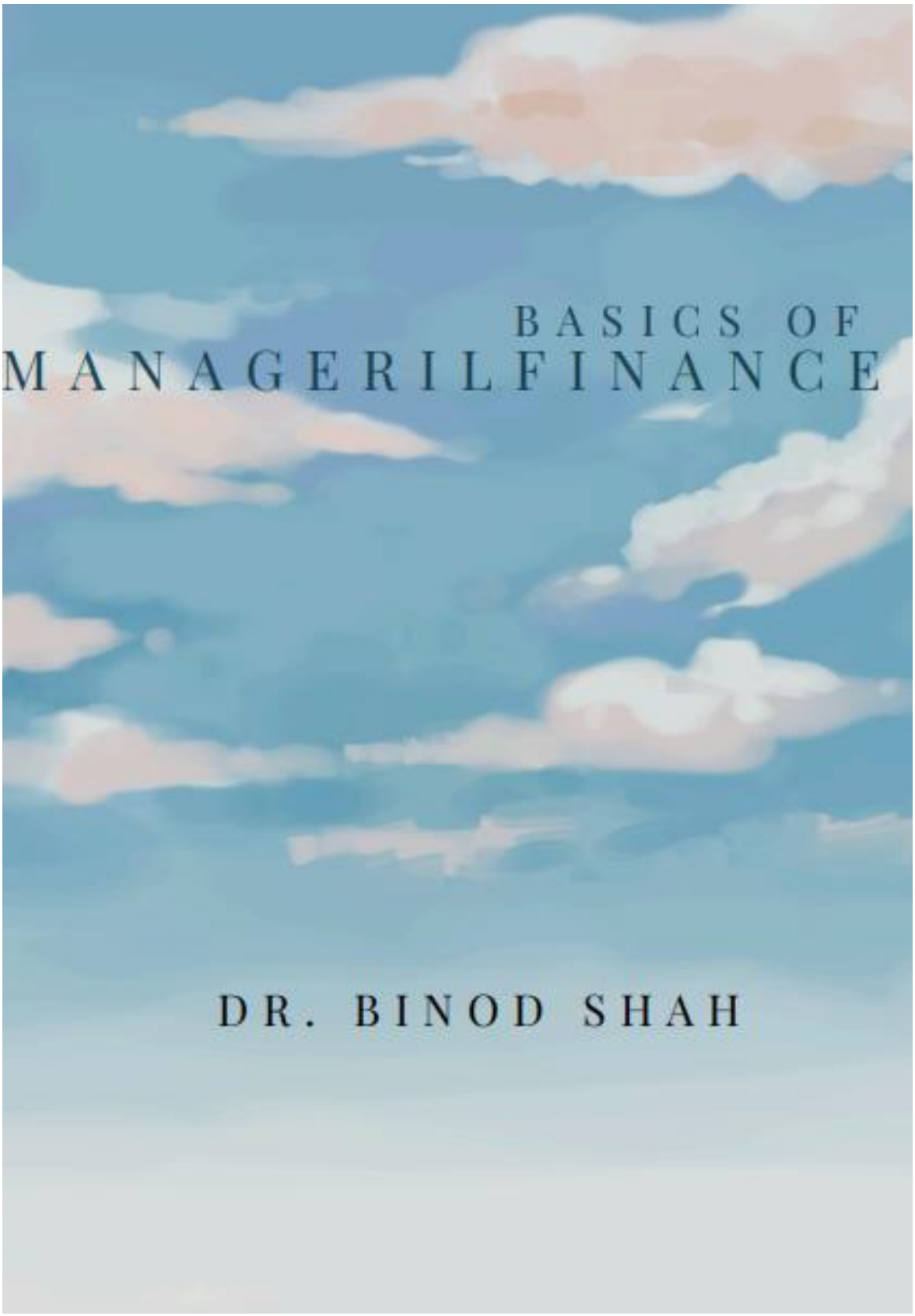
BASICS OF
MANAGERILFINANCE
DR. BINOD SHAH

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Unit 1

Financial Management and Environment

Concept of Financial Management

The term 'financial management', 'corporate finance', 'Managerial finance' and business finance are virtually synonymous and are used interchangeably. Finance can be defined as the art and science of managing money. Virtually, all individuals and organizations earn or raise money and spend or invest money. Finance is concerned with the process, institutions, markets and instruments involved in the transfer of money among individuals, business and governments. Financial management as an academic discipline has undergone fundamental changes with regard to its scope and coverage. In the earlier years, it was treated synonymously with the raising of funds. In the later years, its broader scope, included in addition to the procurement of funds, efficient use of resources.

In general, **Financial Management** is an art and science of managing funds for a business firm. But, in broad sense, it is considered as the process of the acquisition, financing and managing of funds for sound mobilization of other resources of the business firm to achieve the wealth maximization goal. It is concerned with the planning, forecasting, acquisition, financing, implementing, and controlling of funds. Thus, the most important decision functions of corporate finance are: the investment, financing, current assets management, and dividend decisions which help for shareholders' wealth maximization.

Investment decision is one of the important managerial decisions about allocation of capital for long term investment. **Financing decision** is capital structure decision. It is another important managerial decision which is concerned with finding of sources, and raising funds at minimum overall cost of capital. **Current asset management** is also known as working capital decision and it is concerned with managing current assets like inventories, receivables, cash etc. Sound current assets management decision helps to maintain efficiency and good liquidity position of the firm. **Dividend decision** is another key decision of financial management which concerns how much of earnings to be paid out as dividends to its shareholders and how much to retain for reinvestment in the firm.

In this dynamic and globalization business environment, role and responsibilities of financial manager is extremely high. After the half of the nineteenth century, financial manager is required to play vital strategic role for smooth operation of business firm due to increasing in accepting of present value concept, heightened of corporate competition, technology change, and change in interest rates, exchange rates, tax rates, worldwide economic uncertainty, and economic globalization.

Functions of Financial Management

Financial Management is the process of the acquisition, financing, managing and controlling of funds to mobilize all other resources for smooth operation of the business firm. It plays vital role for the success of any business firm and to achieve targeted goal. Traditionally it was concerned only with acquisition of funds at reasonable cost, but at present, corporate finance is not concerned only in acquisition of funds but it is also concerned in planning and forecasting, allocating, implementing and controlling of financial resources. The function of financial management can be broadly classified in the following two categories.

i. Executive finance functions
ii. Routine finance functions

i. Executive finance functions

Executive finance function is also called managerial finance function. The executive functions of financial management are concerned with decision making about different financial resources. It is possible only with strong managerial ability, experience, and skill. Therefore, executive finance functions are performed by top level finance executives. The basic executive finance functions are as follows:

a. Financing decision: Financing decision is concerned with finding the potential sources of fund and raising funds with optimal mix of debt and equity at minimum cost. It is also known as capital structure decision. The key function of financial manager is to determine the optimal capital structure that helps to reduce the overall cost of capital and maximize the value of firm. The key aspects covered under financial decision are as follows:

- Determination of amount of fund to be raised.
- Searching and finding appropriate sources of fund.
- Determination of long-term medium term and short-term funds requirement.
- Estimation of cost of each capital component and overall cost of capital.
- Establishing trade- off between short-term and long-term financing.

b. Investment decision: Investment decision is concerned with the long- term investment in fixed assets. It focuses to invest in fixed assets like plant and machinery, furniture, land and buildings, other long- term projects etc. It covers a number of issues such as which assets to buy, when to buy, how to buy and weather to replace the existing assets with new assets or not etc. As it has far reaching impact on the profitability and risk of the firm, it is considered one important executive function of financial management. The key areas covered under investment decision are as follows:

- Determination of the size of fund to be invested in long- term projects.
- Evaluation and selection of suitable investment proposals.
- Measurement of risk of investment proposals.
- Determination of fixed assets to be purchased.

- Decisions about lease versus purchasing, replacement of existing assets etc.

c. Current asset management decision: While investment decision is primarily focused on long-term investment decision, the current asset management decision is related with the management of various current assets required for the operation of business. It focuses on to decide that what currents assets are to be maintained in the firm and how to finance for current assets like cash, investment, receivable etc. It is also known as working capital management decision. It is concerned with managing current assets to maintain efficiency and sound liquidity position of the firm. Optimum investment in current assets is the must to maintain balance between liquidity, profitability and risk of firm. Therefore, taking working capital decision is another important executive finance function.

d. Dividend decision: Dividend is the part of earning of the firm which is distributed as return to the shareholders. Dividend decision of the firm is concerned with the division of profit into two parts i.e. to be paid as dividend and retained for reinvestment. This decision influences on the wealth position of stockholders and value of the firm. Therefore, financial manager has to make appropriate dividend payout ratio and retention rate for shareholders wealth maximization.

e. Risk management function: Risk is the possibility of losses due to uncertainty of events. It is the deviation between expected rate of return and actual rate of return due to the chances of unfavorable events. Risk is created due to various factors such as changes in interest rates, prices, tax rates, exchange rates, inflation rates, labor strike, lack of efficiency in management etc. The financial manager is responsible to manage for these overall risks by using diversification of investment heading, insurance policy, etc. The wealth maximization will not be an appropriate goal until and unless the risk is managed. The management of risk exposure to maintain optimum risk-return trade-off maximizes shareholder value. So, the quantifying the risk is also an important finance functions. Derivatives are the instruments most commonly used in financial risk management. The derivative instruments include options, futures contracts, forward contracts, and swaps.

ii. Routine finance functions

Routine finance functions are also called incidental finance functions. These functions are carried out by the junior employees in finance section and performed for the effective executive of managerial finance functions. Some important routine finance functions are as follows:

- Supervision of cash receipts and disbursements.
- Safeguarding of cash balance
- Safeguarding of valuable documents and assets.
- Taking care of mechanical details concerning with financing.

- Maintaining records of the firm's activities having financial implications.
- Timely reporting of financial information to the top level management.

Objectives of Corporation

Every firm is established keeping with the view to achieve certain goals. Various business firms have different goals such as profit maximization, sales maximization, cost minimization, service maximization, wealth maximization etc. The goals pursued by the firm guides their activities. From the view point of financial management, there are two broad goals of the business firm: Profit maximization and shareholders' wealth maximization. However, most of the modern business firm's primary goal is their shareholders' wealth maximization. These two broad goals of the firm are discussed hereunder.

1. Profit maximization

As per this school of thought, business firms are the economic institutions. Therefore, their primary goal should be increase in economic profit. It focuses on the selection of those projects which help to increase profit and reject those projects which decreases the profit. Various arguments have been offered in favor of profit maximization goal of the firm. The major arguments are as follows:

- Profit maximization is an indication of success of business firm.
- It indicates efficient utilization of various resources.
- Profit is better incentive to work.
- A profitable firm can take part in different social activities. Thus, it increases social welfare.
- Profit maximization increases the competitive strengths of the firm.

Despite among arguments in favor of profit maximization goal, this goal has been criticized hereunder:

i. Goal is not clear: The profit maximization goal is not clear. There are different forms of profit such as short term profit or long-term profit, profit before tax or profit after tax, gross profit or net profit, etc. This goal is unable to indicate which profit should be maximized. Therefore, the goal is vague or not clear.

ii. Ignores time value of money: The profit maximization goal fails to make distinction between the profits received in different time period. Thus, it ignores the timing of returns. It equates a rupee received today with a rupee will be received in future. In fact, money received at present has worth more than the same money will be received in future.

iii. Ignores risk factor: Profit maximization goal fails to consider risk factor. It is more focused towards the size of profit and fails to give attention towards the variability of profit.

iv. Ignores social responsibilities: The profit maximization goal limits the efforts of firms only towards maximization of profit however, in modern business environment; firms have various responsibilities towards different stakeholders. It cannot peruse profit maximization as its sole objective.

2. Wealth Maximization / Value Maximization /Stock Price Maximization

Creating the value means maximizing value of investment or assets in long run but not just increase the current profit but it also helps to increase the current stock price. So, this goal is also known as **the stock price maximization or shareholders' wealth maximization.** Shareholders' wealth maximization goal of the firm has been introduced to overcome the limitations of profit maximization. It is also called stock price maximization. It is considered as better operating goal of the firm. This goal emphasizes on the increase in wealth position of shareholders in long-run. The wealth position can be increased through the value maximization of firm. The value of the firm is maximized when the net present value (NPV) is increased. The NPV is defined as the difference between the total present value of future cash flows and the initial investment.

NPV = Total PV of future cash inflows – Net cash outlay

Mathematically,

$$NPV = \left[\frac{CF_1}{(1+k)^1} + \frac{CF_2}{(1+k)^2} + ...+ \frac{CF_n}{(1+k)^n} \right] - I_0$$

Where,

CF= Cash inflows

k= Discount rate or, required rate of return

n= Time period

I_0= Initial Investment or, Net cash outlay.

Wealth maximization is generally preferred because it considers:

i. Shareholders' wealth maximization goal is clear: Shareholders' wealth maximization goal is clear. It focuses on the maximization of NPV. The term NPV gives same meaning to all users i.e. difference between total present value of the future cash flow and initial investment.

ii. It considers time value of money: In contrast to profit maximization, the shareholders wealth maximization objective considers the time value of money. It makes clear distinction between the cash flows received during the different period of time. Thus, it regards the fact that the money in hand today has worth more than that the money to be received in future.

iii. It considers risk factor: The profit maximization goal does not consider variability of cash flow. Thus, it fails to consider risk factor. But, shareholders' wealth maximization

objective considers it. It focuses the project/s with less variable cash flow over the project with more variable cash flows.

Value Maximization and Social Welfare

We have just explained that value maximization is the primary goal of the firm. So, managerial actions and financial decisions should be focused on that direction. But it does not mean anything can be done. While making decision, one thing is should be noted that there is society behind the corporations. That means, what is the linkage between value maximization and social welfare. There are various ways to support the nation and society. Philosophically, your best contribution to the society and nation is your good deeds. Similarly, if corporations are doing their business activities without doing illegal actions, making frauds, exploiting monopoly power, damaging environment, the corporations are doing best for the society. Making profit by doing illegal activities and giving donation is not good.

Value maximization means making the good value of the corporation in this society by getting the sources from the society and by serving the consumer of society. Doing good and ethical business corporation is the social welfare in itself. Furthermore, this aspect can be supported by the following reasons;

a. Shareholders are the members of this society
b. Consumers are benefited by the product or services of the corporation
c. Corporations are generating employments

Managerial Action to Maximize Shareholder Wealth

We have already mentioned that value represents the value of the shareholders. We should be clear that shareholders have residual claim on business. That means, they are entitled to get only what has been left after paying to employees, suppliers, and creditors. So, to find out the value we need to consider following two factors; 1) Free cash flow (FCF) and 2) Cost of Capital (k)

$$NPV = \frac{FCF_1}{(1+k)^1} + \frac{FCF_2}{(1+k)^2} + \frac{FCF_3}{(1+k)^3} + \cdots\cdots\cdots\cdots \frac{FCF_n}{(1+k)^n} - I_0$$

Where,

NPV = Net Present Value

I_0 = Initial Investment

K = Cost of Fund or Required Rate of Return

FCF = Free Cash Flow

It is not easy to get this goal or to fulfil this objective. Various strategic financing decisions are to be made for this instance. As mentioned in above formula, there are two key inputs on value of the firm; 1) free cash flows, and 2) WACC i.e. overall cost of

capital. Therefore, managerial action should be focused to increase amount of free cash flows and to decrease the overall cost of capital.

a. **Increment in free cash flows:** Free cash flows means the amount of cash available to distribute to the supplier to the capital i.e. to creditors and to shareholders. To increase the amount of free cash flow, managerial effort should to focus to increase the sales volume by bearing less operating costs and tax. For which there should be economic and optimal investment in operations.

b. **Minimizing WACC:** If managerial actions are focused to reduce the WACC by making optimal capital structure, that helps to increase the value of firm. Weighted average cost of capital (WACC) is the overall cost of capital of entire capital of the firm. That includes three components and their respective weights. Cost of debt, cost of preferred stock and cost of equity are the component of WACC. Through the appropriate mix of debt, preferred stock and equity, company can reduce the WACC.

Role of Financial Manager

The person who is responsible for all financial decision is known as financial manager but it is not such a simple to define the financial manager. The financial managers, its functions and roles depend upon the nature and size of business. The financial manager indicates to all; the financial officer (CFO), Treasurer, controller, insurance and risk manager, cash and credit manager etc. The main objective of financial management is to arrange sufficient finance for meeting short term and long term needs. A financial manager will have to concentrate on the following areas of finance function.

1. **Estimating financial requirements:** The first task of a financial manager is to estimate short term and long term financial requirements of his business. For that, he will prepare a financial plan for present as well as for future. The amount required for purchasing fixed assets as well as need for working capital will have to be ascertained.

2. **Deciding capital structure:** Capital structure refers to kind and proportion of different securities for raising funds. After deciding the quantum of funds required it should be decided which type of securities should be raised. It may be wise to finance fixed assets through long term debts. Even here if gestation period is longer than share capital may be the most suitable. Long term funds should be employed to finance working capital also, if not wholly then partially. Entirely depending on overdrafts and cash credits for meeting working capital needs may not be suitable. A decision about various sources for funds should be linked to the cost of raising funds.

3. Selecting a source of finance: An appropriate source of finance is selected after preparing a capital structure which includes share capital, debentures, financial

institutions, public deposits etc. If finance is needed for short term periods then banks, public deposits and financial institutions may be the appropriate. On the other hand, if long term finance is required then share capital and debentures may be the useful.

4. Selecting a pattern of investment: When funds have been procured then a decision about investment pattern is to be taken. The selection of an investment pattern is related to the use of funds. A decision will have to be taken as to which assets are to be purchased? The funds will have to be spent first on fixed assets and then an appropriate portion will be retained for working capital and for other requirements.

5. Proper cash management: Cash management is an important task of finance manager. He has to assess various cash needs at different times and then make arrangements for arranging cash. Cash may be required to purchase of raw materials, make payments to creditors, meet wage bills and meet day to day expenses. The idle cash with the business will mean that it is not properly used.

6. Implementing financial controls: An efficient system of financial management necessitates the use of various control devices. They are ROI, break even analysis, cost control, ratio analysis, cost and internal audit. ROI is the best control device in order to evaluate the performance of various financial policies.

7. Proper use of surpluses: The utilization of profits or surpluses is also an important factor in financial management. A judicious use of surpluses is essential for expansion and diversification plans and also in protecting the interests of shareholders. The ploughing back of profits is the best policy of further financing but it clashes with the interests of shareholders. A balance should be struck in using funds for paying dividend and retaining earnings for financing expansion plans.

Agency Conflicts

An agency relationship arises whenever one or more individuals, called principals, hire one or more other individuals, called agents, to perform some service and then delegate decision-making authority to the agents in consideration of fixed compensation. Primarily two important agency relationships exist in large firms:

1. Shareholders and Managers
2. Shareholders and Creditors

In this type of relationship, there is a chance of conflicts to occur between the principal and the agent because of diverse interests. This conflict is termed as agency problem. The costs incurred by stockholders in order to minimize agency problem and maximize the owner's wealth are called agency costs.

1. Shareholders and Managers

In a corporation, shareholders have ownership and control power of the company because they are the real owner. Managers are taken as agents to serve for the owner by

getting their incentives. That means shareholders are taken as principal (owners) and the managers are as an agent of owners because they are hired to act on behalf the owner's interests. Managers are taken as agents to serve for the owner by getting their incentives. So, there is the delegation of decision making power to increase the value of firm. Theoretically, manager must work for to maximization the wealth of shareholders. But in practice, manager may place more emphasis on his/her personal benefit. As such conflict occurs between the interest of shareholders and manager. Managers are often not found acting in the best interest of shareholders because of following reasons:

- Shareholders can diversify their investment but the skill of managers is confined to only one company.
- Mangers remunerations are fixed. They cannot participate in the benefits resulting from the risks they take.

Agency problem should be resolved in time. Otherwise it may push the company towards problem. A number of specific mechanisms can be used to resolve the agency problem between shareholders and manager.

i. Structuring managerial compensation: Managers obviously must be compensated, and the structure of the compensation package can and should be designed to attract and retain able managers and to align manager's actions as closely as possible with the interest of stockholders' who are primarily interested in stock prices maximization. Different company follows different compensation practices, but a typical senior executive's compensation is structured in three parts.

- A specific annual salary, which is necessary to meet living expenses.
- A bonus paid at the end of the year
- Option to buy stock.
- Bonus shares

ii. Direct intervention by shareholders: Direct intervention by the shareholders is another mechanism to resolve the conflict between shareholders and managers. Such intervention could be taken in different forms such as by passing a resolution against the interest of management, using expertise of institutional investors, calling extraordinary general meeting to discuss and decide on direct intervention as per the provision of rules and regulation of the company.

iii. The threat of firing: Another way of resolving the conflict between management and shareholders is the threat of firing. The existing management is expected to be fired by the board of directors if management acts on their own interest than shareholders interest. Board of directors pressurizes them to resign.

iv. The threat of takeover: Hostile Takeover (When management does not want the firm to be taken over) is mostly likely to occur when a firm's stock is undervalued relative to its

potential value because of mismanagement. In a hostile takeover, the managers of the acquired firm are generally fired, and any who manage to stay on loose status and authority. Thus, managers have a strong incentive to take actions designed to maximize stock prices.

Agency costs are costs that a principal incurs to decrease or eliminate the agency problem by providing agent with incentive to act in the best interest of the principal as well as by monitoring the agent's actions to ensure the agent is acting honestly and in the best interests of the principal. Agency costs include all costs borne by shareholders to encourage mangers to maximize a firm's stock price rather than act in their own self-interests. The three major categories of agency costs are as under:

a. Expenditures to monitor managerial actions such as audit costs.
b. Expenditure to structure the organization in a way that will limit undesirable managerial behavior such as appointing outside investors to the board of directors and
c. Opportunity costs which are incurred when shareholder-imposed restrictions, such as requirements for stockholder votes on certain issues, limit the ability of managers to take timely actions that would enhance shareholder wealth.

2. Shareholders and Creditors

In addition to conflict between stockholders and managers, there can also be conflicts between creditors and stockholders. Both shareholders and creditors provide fund to corporation. Creditors have a claim on part of the firm's earnings stream in the form of payment of interest. The returns offered to creditors are fixed whereas the returns to stockholders are not fixed. While shareholders want to maximize the value of the firm by taking high risk, creditors oppose high risk. It may create conflict between stockholders and creditors. This kind of potential conflict between the shareholders and creditors can be resolved by compensating the creditors for increased risk by increasing interest rate and putting protective terms and conditions in debt contract.

Corporate Governance

Corporate governance is the standard base to make decisions and implementation, to carry out administrative functions, and to control on misleading. Corporate governance is the system in itself so that company moves in a right direction to achieve sustainable success. It is the set of rules, guidelines, practices and processes by which a company direction of the business is defined and actions or activities are controlled. Corporate Governance shows the way to govern the corporation as per the corporate purpose and social welfare. It clearly defines the power and accountability, and who makes decisions.

Corporate governance demands that for the sustainable success of the corporation the interest/concerns of all stakeholders should be taken in consideration so that all stakeholders will be benefited by the corporate decisions. That means, by fulfilling principles of corporate governance, corporation can achieve its goal along with social goals, economic goal and individual goal as well.

True corporate governance shows the clear path for future course of action by providing the guidelines in aspect of management i.e. in planning, implementing, and controlling and performance management. Other aspects of corporate governance are;

- It helps to set strong corporate culture and perfect corporate governance practices.
- To go through the good governance, at least there should be diverse professional expertise and communication and discussion in time on critical issues so that there will not be any harm to any stakeholders.
- It sets the internal control systems and ensures for the accountabilities of each level of corporation.
- Adequate information on time, making good decision, presenting the agendas in advance, setting sufficient time for the central issues for the discussion and taking the decisions are the bases for corporate governance.
- Good governance creates a win-win situation for all stakeholders.
- Corporate governance demands for the adoption of the transparent procedures and practices in corporation.

Business Ethics and Corporate Social Responsibility

Business ethics and corporate social responsibility are the growing concerns of current business world and being crucial to the financial manager to consider because every business organization starts their business activities, grows, makes profit and survives in society. And, if cannot, it will die in society. Simply, ethics means the standards of conducts and moral behavior is ethics. Similarly business ethics can be explained as the corporation's conducts and behavior toward its employees, customers, community, and stockholders. Ethical behavior and moral conduct creates a good corporate culture. Corporate culture helps to increase the value of the firm and leads the corporate activities in a good manner. A good corporate culture starts and grows among the members and transmits from one generation to another. In corporate finance, business ethics are meant to ensure a certain level of trust between consumers and corporations, guaranteeing the public fair and equal treatment. Business ethics ensure that a certain basic level of trust exists between consumers and various forms of market participants with businesses.

Financial managers must have the skills to handle large sums of other peoples' money, but skill alone may not enough. Most of the financial decisions involve not only the means but also the ends. That means financial managers are in the post to increase the value of others' investment along with their own career. Intentional or situational bad decisions of financial managers may ruin a company through bad judgment. It's essential to have a code of ethics in finance and to live up to those principles every day. Success or failure of the company is normally measured in financial terms. Sometimes, loss due to unethical and bad financial decisions cannot be compensated. Therefore, there should be ethics in financial decision. Financial managers should follow the standard norms and behavior to make the financial decisions. Most of the ethical norms and standards are explained by law and governments authorities, enforced by concern authorities and monitored by regulatory bodies.

By setting perfect example of ethics in financial decisions, there will be corporate governance and company can maintain the good corporate culture. Professionalism is the best word to explain about the ethics in corporate finance. Following codes are the required general standards to become a professional financial manager;

- Performing the jobs and duties with honesty and integrity in profession.
- Avoid conflicts of interest in professional relationships. Also, avoid the appearance of such conflicts.
- Provide people with accurate, objective, understandable information. Disclose all relevant information, positive and negative, so that your listeners have an accurate picture.
- Obey with all rules and regulations governing your position and your company.
- Performing with good faith and independent judgment. Don't allow self-interest or other factors to sway your recommendations.
- Maintaining the secrecy and not using it for personal gain.
- Maintain an internal controls system to guard against unethical behavior.
- Report anyone you see violating the code.

Ethical behaviour and corporate social responsibility can bring significant benefits to a business. For example, they may:

- Attract customers to the firm's products, thereby boosting sales and profits
- Make employees want to stay with the business, reduce labour turnover and therefore increase productivity
- Attract more employees wanting to work for the business, reduce recruitment costs and enable the company to get the most talented employees
- Attract investors and keep the company's share price high, thereby protecting the business from takeover.

Unethical behaviour or a lack of corporate social responsibility, by comparison, may damage a firm's reputation and make it less appealing to stakeholders. Profits could fall as a result.

Financial Environment in Nepal

The financial environment implies various types of securities which are available for investment and the entire mechanism or process through which these securities can be bought or sold. The financial environment comprises of three main aspects: securities (also referred as financial assets or financial instruments); securities markets (i.e. financial market) and intermediaries in securities markets. While discussing about the financial environment in Nepal, we should focus our attention on securities, securities market and financial intermediaries in Nepal. The securities available for Nepalese investors are only in limited numbers and basically they are in form of equity. Very limited number of bonds and preferred stocks are issued by Nepalese enterprises to raise funds. So investors are expelling to invest in common stocks. The volume of securities is also very limited so high amount of subscribe capital to collected at the time of initial public offering (IPO). The securities are also from limited areas and mostly from financial sectors. In the context of Nepal, Common stock and government securities are the most popular investment alternative. Corporate bond and preferred stock are available in very limited schemes. The financial securities available in Nepal can be shown as under:

Financial Securities Available in Nepal

Securities	Availability
Common stocks	Available
Preferred stocks	Available
T-Bill	Available
Commercial Paper	Not Available
Certificate of Deposits	Available
Bankers Acceptance	Available
Repurchase Agreement (Repos)	Available
Government Bond	Available
Local Government Bond	Not Available
Corporate Bond	Available
Foreign Bond	Not Available
Option	Not Available
Real assets	Available

Similarly the activity of security market is also very low within the city area and particularly in Kathmandu. In Nepal only one stock exchange: Nepal Stock Exchange (NEPSE) is in practice. So no arbitrage opportunity is available for investors making transactions in two markets. There are very few companies listed in NEPSE and investors are constraint to make their trading on very limited companies and highly they are from financing sector. No sufficient securities are available from manufacturing, trading and other sectors.

The transaction of NEPSE is also primarily based on Kathmandu and stock brokers are also less in numbers so investors are not getting good approach with them. The position of OTC market is not also strong in Nepal. Most of the Nepalese people are neither conscious nor educated about investment and stock market.

Discussing about the financial intermediaries in Nepal, we see that many more banks, mutual funds as well as other institutions are growing day by day in the nation within very short time but they are mostly located in urban area. The people from remote area cannot get chance to use these intermediaries for their saving and investment purposes. Such institutions should also be established in the rural areas of the country.

Financial Securities

An investor can invest in a variety of securities such as equity shares, bonds, debentures, derivatives, mutual funds, exchange trade funds etc. One may also invest in commodities and bullions (such as gold and other precious metals). However, here we are primarily concerned with investments in financial assets or securities. The term security means that the holder of the security has a claim to receive future benefits under certain conditions. These securities may be transferred from one owner to the other without much difficulty. Equity shares, preference shares, bonds and debentures, treasury bills, commercial paper, mutual funds unit, option, warrant etc. are the examples of securities.

1. **Short term securities:** Short-term securities include those investment vehicles which are of less than one year maturity. Treasury bills, commercial papers, banker's acceptance, negotiable certificates of deposit are examples of short-term securities. Short-term securities are highly liquid and less risky. Therefore, they yield low return.

2. **Common Stock:** Common stock is a security that representing a share of ownership in a company. It represents the real ownership of the company. Company issues common stocks to raise permanent ownership capital. Common stocks/shares are known as ordinary shares. Common stockholders have various rights like

preemptive right, voting right, right to get stock certificate, right for dividend, right to receive corporate reports, right on assets, right to be elected in board of directors etc. Common stockholders have residual claim on income and assets. Common stockholders have right on a company's profits and assets after payment of bondholders' and preferred stockholders' claimed and their liability is limited to the amount of their investment in stocks.

3. **Preferred stock:** Preferred stock represents the nominal ownership of the company and it is fixed income security having some characteristics of debt and some of common stock. In one hand, preferred stock is like bond because its dividend income is fixed and has no voting right but in another hand, it is like common stock which has ownership of the company, reward is given in the form of dividend which is paid from after tax-income. Therefore, it is known a hybrid security which is issued by the form for long term financing.

4. **Bonds:** Bond is defined as the long term promissory note, on which the issuer is promising to pay a fixed coupon interest periodically and the maturity or face value or principal at the end of a certain maturity period. Bond is a debt certificate issued to raise long term debt capital by an issuer. The issuers of a bond can be government, corporations, local government and foreign government and corporations. Based on the issuers, the bonds can be classified into the different types: treasury bonds, corporate bonds, municipal bonds and foreign bonds.

5. **Mutual fund:** Investment companies are specialized financial intermediaries that collect money by selling shares of small value to the investors and invest in portfolio of securities. The shares issued by these companies to collect the fund from the investors are called units. Each share that it sells represents a proportionate interest in a portfolio of securities. In return, the investors receive certain rights regarding the financial assets that the investment company has bought and any earnings that the company may generate. The shareholders own the investment company directly and own indirectly the financial assets that the company itself owns. Thus, an investment company sells its own shares to raise money and uses it to purchase financial assets such as stocks and bonds. The three main types of pooled investment vehicles are **open-end mutual funds, closed-end funds, and exchange-traded funds.**

6. **Derivative securities:** Derivative securities are financial instruments whose values are derived from other underlying assets. Options, forward contract, future contract and swaps are some of the examples of derivative securities.

Financial Institutions

Capital allocation process is the process of transferring funds between savers and borrowers in the financial market. The transfer of funds from savers to borrowers can be accomplished in three different ways: direct transfer, indirect transfer through investment bankers and indirect transfer through a financial intermediary. A direct transfer of funds occurs when a business firm or government sell its bonds or stocks directly to saver without going through any type of financial institutions. In indirect transfer through investment banker, a business firm sells its stocks or bonds to the investment banker, which in turn sells these same securities to savers in the primary market. In indirect transfer through financial intermediaries, financial intermediaries or financial institutions obtain funds from savers, issue their own securities in exchange and then use these funds to purchase securities of business firms or government. Direct funds transfers are more common among individuals and small businesses and in economies where financial markets and institutions are less developed. While businesses in more developed economies do occasionally rely on direct transfers, they generally find it more efficient to enlist the services of one or more financial institutions when it comes time to raise capital.

Financial intermediaries or institutions play an important role in today's economy. They are the investment intermediaries linking the savers and users of capital. They accept money from the savers and use these funds to make loans and other investments in their own name. Financial intermediary is a special financial entity, which performs the role of efficient allocation of funds, when there are conditions that make it difficult for lenders or investors of funds to deal directly with borrowers of funds in financial markets. The financial intermediaries are engaged in obtaining funds from lenders or investors and lending or investing the funds that they borrow to those who need funds. Financial intermediaries can be banking financial institutions and non-banking financial institutions.

A. Banking financial institutions: These institutions involve in banking transactions. They include: commercial banks and development banks.

1. Commercial Banks: These banks are one the major financial intermediaries whose primary objectives is to earn profit through mobilization of funds and performing merchant banking functions. They operate currency exchange transactions, accept deposits, provide loan, perform dealing, relating to commerce. They accept deposits, provide loan, perform dealing, relating to commerce. They collect deposit from the saving of individuals and institutions and provide short-term as well as long –term

loans to business and individuals. They also perform services like stock brokerage, collection of bills and cheques, safe-keeping of valuable assets, issue of credit instruments, foreign currencies exchange, and issue of guarantee, insurance etc. Commercial banks also invest their deposits into the business securities. In Nepal there are altogether 26 commercial banks. For example, Rastriya Bank Ltd, Nepal Bank Limited, Agriculture Development Bank, Civil bank, Nabil bank, Standard Chartered Bank, Everest Bank, Global IME, Prabhu bank, Sunrise bank etc. are some popular commercial banks operating in Nepal.

2. Development banks: These are the banks which established to develop a particulars sector of economy by providing financial, technical and administrative assistance. They collet funds from share capital, debentures, long-term deposits and provide long-term loan, technical and other advance as well.

B. Non –Banking Financial institutions.

Financial institution also includes different types of non-banking financial institutions too. They can be.

1. Financial Companies: They are also called 'Loan Companies'. They collect deposits and provide the loan to buy land, to buy and build the house, etc. by taking movable and immovable properties as securities. Finance companies play a key role in modern economic transactions. They provide funding for corporate operations in the short term and long term.

2. Credit Unions or Coordinative institutions: The credit unions or cooperative institutions are the important financial institutions. Such institutions can accept the deposit from its members and other persons and can give the loan to its members for auto purchases, home improvement loans and home mortgages. Credit unions are often the cheapest sources of funds available to individual borrowers.

3. Saving and loan Associations: They traditionally served individual savers and residential and commercial ,mortgage borrowers, taking the funds of many small savers and then lending this money to home buyers and other types of borrowers.

4. Provident fund: A provident fund is also a kind of financial institution, which collects a certain amount of money out of monthly salary of officials who work in the government offices, companies, corporations and other organized institutions. In Nepalese government officers, it is created contributing 10 percent from the basic salary of each permanent employee and adding the same amount by the government. This fund may be invested in business and government securities. It also provides loan to its members using the collected fund in their accounts as collected.

5. Insurance companies: They are the financial institutions which have been established in both private and government sectors. An insurance company provides economic

protection to the customers and helps in the economic development of the nation by utilizing the savings. It creates a large fund with the amount collects as a premium from different persons and the organizations. They are capable to make long-term investment of large amount and they make it. For instance, Rastriya Beema Santhan Ltd. National Life and Genaral insurance Corporation (Nepal) Ltd. , Nepal life insurance Company Limited etc. are some of the examples of insurance companies which are operating in Nepal.

6. Mutual Funds: They are the important financial institutions. They are investment companies that accept fund from savers and then use these funds to purchase various types of financial assets such as stocks, long-term as well as short –term bonds and debt instruments. In real sense, mutual funds make investment on behalf of savers.

7. **Pension Funds:** They are retirement plans funded by corporations or government agencies for their workers and administered preliminary by the trust departments of commercial banks or by life insurance companies. Pension funds invest primarily in bonds, stocks, mortgages, and real estate. However, there is no specialized pension fund in Nepal.

Financial Market

Financial market is a mechanism that facilitates for the trading of financial assets. It is a market for creation and exchange of financial assets. Effective mobilization of the fund from the financial securities plays the vital role in the economic development because raised fund is directly invested in the real assets to produce the goods and services for the country. As we know, real assets of the country determine the wealth of an economy whereas financial assets merely represent claims on real assets. Financial assets and market in which they are traded play several crucial roles in developed economy due to the marketability, liquidity, divisibility and the availability of the information regarding to the financial assets.

Securities markets bring together the buyer and seller of securities and provide operational mechanism to facilitate the exchange of securities. An efficient and developed security market is a prerequisite for increased investment in securities. It is the important component of financial system. It can be defined as the place where different types of financial securities are traded. It creates the bridge between surplus facing unit and deficit facing unit. It facilitates the flow of funds and thereby allows financing and investing by households, firms and government agencies. A market where the financial instruments (securities) can be purchased or sold is called Securities Market. Financial market gives strength to economy by making finance available at right place. It facilitates the flow of savings generated from one sector of economy to

another, where there is demand for funds. The basic functions of financial market can be listed as follows:

- Providing a mechanism for trading of securities
- Mobilization of savings
- Facilitates price discovery
- Provides liquidity to financial assets
- Reducing the cost of transaction

Types of Financial Market

Financial market can be broadly classified as under:

1. Debt and Equity Markets

A firm or an individual can obtain funds in a financial market in two ways. The most common method is to issue a debt instrument, such as a bond or a mortgage, which is a contractual agreement by the borrower to pay the holder of the instrument fixed amounts at regular intervals (interest and principal payments) until a specified date (the maturity date), when a final payment is made. The maturity of a debt instrument is the number of years (term) until that instrument's expiration date. A debt instrument is short-term if its maturity is less than a year and long-term if its maturity is 10 years or longer. Debt instruments with a maturity between one and 10 years are said to be intermediate-term.

The second method of raising funds is by issuing **equities,** such as common stock, which are claims to share in the net income (income after expenses and taxes) and the assets of a business. Equities often make periodic payments (**dividends**) to their holders and are considered long-term securities because they have no maturity date. In addition, owning stock means that you own a portion of the firm and thus have the right to vote on issues important to the firm and to elect its directors.

The main disadvantage of owning a corporation's equities rather than its debt is that an equity holder is a residual claimant; that is, the corporation must pay all its debt holders before it pays its equity holders. The advantage of holding equities is that equity holders benefit directly from any increases in the corporation's profitability or asset value because equities confer ownership rights on the equity holders. Debt holders do not share in this benefit, because their payments are fixed.

2. Primary and Secondary Markets

Primary market is the market where new securities are issues for the first time; while **secondary market** provides the platform where existing (or second hand) securities are bought or sold. A well-functioning primary market is essential for the growth of investments in an economy. At the same time a transparent and efficient secondary

market that ensures speedy transfer of ownership of securities, is a prerequisite for investment in a particular security.

Difference between primary and secondary market

Primary Market	**Secondary market**
It is a market where new securities are issued for the first time by an existing or new company.	It is the market for trading of already issued and existing securities.
The issuer company itself decides the price of securities for the first time using the book building method. It can decide the amount of premium also.	Price of securities is determined by the interplay of market forces of demand and supply operating at the stock exchange.
Prices (the issue price) of securities are fixed.	Prices of securities vary on the basis of demand and supply forces.
The new securities are sold by the company and bought by investors.	The buying and selling of securities usually happens between investors.
Primary market is a platform for companies to raise finance for expansion, diversification, etc.	There is no fund raising by companies because there is no issue of securities in secondary market. Only trading of existing securities is done here.
Primary market directs the flow of funds to productive use in business, thereby directly resulting in capital formation.	Secondary markets provide liquidity to investors, thereby indirectly leading to capital formation.
Main intermediaries operating in primary market are investment bankers, underwriters etc.	Secondary market has intermediaries like brokers, sub-brokers, etc.

3. Capital Market and Money Market

Capital market is the market for long term financial investment and instruments (more than one year), while **money market** deals with short term securities (one year or less). Capital market primarily deals with equity shares, long term bonds and debentures, while money market deals with Treasury bills, short term debts such as commercial paper, certificates of deposits etc.

Difference between Capital and Money market

Capital market	Money market
It is the market for long term capital instruments such as equity shares, debt etc. These instruments have a period of 1 year or more.	It is the market for short term financial instruments having maturity in less than 1 year. These instruments are certificates of deposits, commercial papers, Treasury bills etc.
Capital market can be further subdivided into the following three segments— (i) Equity market (ii) Debt market (iii) Derivatives market	Money market can be sub-divided into the following segments— (i) Treasury bills market (ii) Commercial papers market (iii) Certificate of Deposits market (iv) Call money market
Capital market instruments have less liquidity than money market instruments.	Money market instruments have very high liquidity.
Capital market is used by participants for the purpose of raising funds or capital for medium to long term.	Money market is used by participants as a means for borrowing and lending in short term, with maturities less than a year.
The rate of return in capital market is relatively high due to longer maturity period.	The rate of return in money market is relatively low due to short maturity period.
Capital market is essential for overall growth of the economy.	Money market is essential for maintaining liquidity in the economy.

4. Exchanges and Over-the-Counter Markets

Secondary markets can be organized in two ways. One method is to organize **exchanges**, where buyers and sellers of securities (or their agents or brokers) meet in one central location to conduct trades. The New York and American Stock Exchanges for stocks are examples of organized exchanges. Nepal Stock Exchange (NEPSE) is the organized securities exchange market in Nepal. The other method of organizing a secondary market is to have an **over-the counter (OTC) market,** in which dealers at different locations who have an inventory of securities stand ready to buy and sell securities "over the counter" to anyone who comes to them and is willing to accept their prices. Because over the- counter dealers are in computer contact and know the prices set by one another, the OTC market is very competitive and not very different

from a market with an organized exchange. In Nepal, there is no such network of dealers for unlisted stocks. Nepal Stock Exchange operates the OTC market as well. Many common stocks are traded over the counter, although a majority of the largest corporations have their shares traded at organized stock exchanges.

5. Spot versus Future market

Spot and future market is another classification of the security market based on the delivery of assets and payment. **In spot Market** there is immediate delivery and payment upon the transaction of assets. The transactions that we have discussed in above markets are the spot transaction and these all are the example of spot markets.

On the other hand, in **future market,** only the agreement is made today but cash settlement and actual delivery of assets will be made in future date as per the initial negotiation in contract. Options, futures, forwards, and swaps are the derivative securities traded in future market.

Tax Environment

Knowledge of the tax laws can help the investors to reduce taxes and increase the amount of after tax rupees available for investing. Both individuals and businesses must pay taxes on their incomes. The type and rates of taxation that businesses must pay depends on how they are organized. Generally, when organized as a corporation, business income is taxed at corporate taxes, whereas business income of sole proprietorships and partnerships is taxed at the rates of the individual owners or partners.

Capital gains taxes

The capital gain tax on the sale and purchase of shares of entities registered with Securities Board of Nepal has been maintained at 10 percent in the case of entities and 5 percent in the case of individuals. However, disposal of shares by mutual fund does not attract the provision of capital gain tax.

Interest and dividend income

Dividend and interest income received by individuals from corporate securities is added to other income. Corporations pay dividends out of earnings that already have been taxed; there is double taxation of corporate income. The interest income for individual is taxed at 5 percent and 15 percent for corporate investor. Dividend income is taxed at 5 for individual and corporate investor. It is noted that interest and dividend provided to the mutual fund is exempted from tax. But dividend income from mutual

fund investment is taxable at 5 percent for individual and 15 percent for corporate investor.

Unit 2
Financial Statement Analysis

Financial Statement

A firm communicates financial information to the users through financial statements and reports. Financial statement contains summarized information of the firm's financial affairs, organized systematically. They are the means to present the firm's financial situation to the users. Preparation of financial statement is the responsibility of top management. As these statements are used by investors and financial analysts to examine the firm's performance in order to make investment decisions they should be prepared very carefully and contains as much information as possible,

Two basic financial statements prepared for the purpose of external reporting to owner's, investors and creditors are (i) balance sheet and (ii) income statement. Financial statements may also include statement of retained earnings and statement of cash flows. These statements are contained in a company's annual report. A typical annual report also includes the chairman's speech, the director's report, the auditor's report and accounting policy changes. The financial statements contain the basic financial information about revenues, expenses, assets, liabilities and cash flow during a specified period.

Balance Sheet

Balance sheet is the most significant financial statement. It indicates the financial condition or the statement of affairs of a business at a particular moment of time. More specifically, balance sheet contains information about resource and obligations of a business entity and about its owner's interest in the business at a particular point of time. In the languages of accounting, balance sheet communicates information about assets, liabilities and owners' equity for a business firm as on a specific date. It provides a snapshot of the financial position of the firm at the close of the firm's accounting period.

Assets: Assets represent economic resources. Assets are the future benefits. Assets are the legal claim of the business firm. Assets include:

i. **Current assets:** Current assets are those assets which are either in the form of cash and can be converted into cash within the year. Cash, cash at Bank, sundry debtors, Account receivable, inventory, marketable securities, prepaid expenses,

Bills receivable, loan and advance, short term investment etc. are the example of current assets.

ii. **Fixed assets:** The assets which are purchased in the business for use not for resale are called fixed assets. Such types of assets provide benefit in many years. Tangible fixed assets include land and building, Plant and machinery, furniture, equipment, vehicles etc. Intangible fixed assets include goodwill, Patten, copyright, Trade mark etc.

iii. **Investment:** Investment in shares or bonds of other companies, investment in government bonds etc.

iv. **Fictitious assets:** Preliminary expenses cost on issue of shares, accumulated loss etc.

Liabilities

Liabilities are debt payable in the future by the firm to its creditors. They represent economic obligations to pay cash or to provide goods or services in same future period. Generally, liabilities are created by borrowing money or purchasing goods or services on credit. Examples of liabilities are creditors, payable outstanding expenses, bonds, debentures, borrowing, public deposits etc. Liabilities can be classified as:

i. **Current liabilities:** The liabilities which are payable by the firm within one year are called current liabilities. They include creditors (A/P), Bills payable, Notes payable, Bank overdraft, Short term loan, outstanding expenses, Advance income, Provision for tax, dividend payable, estimated warranty liabilities, unearned income, and Current maturity of Long term debt.

ii. **Long term liabilities or debt:** The liabilities which are payable by the firm is more than 1 year are called long term debt. Bank loan, secured loan, unsecured loan, mortgage loan, bonds, debentures and public deposit are the examples of long term debt.

iii. **Shareholder's Equity:** The financial interest of the owners are called owner's equity. It is residual in nature, reflecting the excess of the firm's assets over its liabilities. Equity is the insider's or owner's liabilities. Owner's equity includes share capital, share premium and receive and surplus.

Remember that:

a. Total debt = Current liabilities + Long term debt

b. Shareholder's equity = Common stock + preferred stock + Paid in capital + Retained earnings – Fictitious assets

c. Common equity = Common stock + Paid in capital + Retained earnings – Fictitious assets

Balance Sheet
As on ……..

Assets	Amount	Liabilities & Equity	Amount
Current Assets: Cash and Bank marketable securities Receivable Inventories Advance Expenses Accrued income		**Current liabilities:** Account payable (Creditors) Notes payable Bank Overdraft Accruals /Outstanding Expenses Unearned Income	
Fixed Assets: Land and Building Plant and Machinery Vehicles Furniture and Fixtures Equipment Goodwill Copy Right Trade Mark		**Long Term Debt:** Bank Loan Secured Loan Unsecured Loan Bonds Debentures	
Investment: Investment in shares and debentures Loan to …… Government bonds		**Shareholder's Equity:** Common Stock Preferred Stock Reserves and Surplus Share Premium/ Paid in Capital Retained Earnings	
Fictitious Assets: Preliminary Expenses Discount on shares Expenses on issue of shares Profit and loss Account(Loss)			

Income Statement

A statement which finally provides net income after deducting all costs from sales revenue is called income statement. Income statement provides operating result of a firm for the specific period of time. All the expenses and incomes of an accounting period is covered by an income statement. Income statement is also called profit and

loss account. On an income statement if revenue exceeds the expenses, that is referred net income and if expenses exceeds the revenue, that is referred net loss. The basic information revealed by the profit and loss account is about revenues, expenses and the income (or loss) of the firm.

Income Statement
For the year ended.....

Particulars	Details Rs.	Amount Rs.
Net Sales		XXX
Less: Cost of goods sold		XXX
Gross profit		XXX
Less: Operating expenses:		
General and administrative expenses	XXX	
Selling expenses	XXX	XXX
Depreciation and amortization	XXX	
Earnings before interest and tax (EBIT)/ Operating profit		XXX
Less: Interest		(XXX)
Add: Other income		XXX
Less: Non-operating expenses		(XXX)
Earnings before tax (EBT)		XXX
Less: Provision for tax		XXX
Net profit after tax (NPAT)/Net income		XXX
Less: Provision for dividend		XXX
Retained earnings		XXX
Per Share Data:		
Earnings per share (EPS)		XXX
Dividend per share (DPS)		XXX
Common stock price (MPS)		XXX
Book value per share (BVPS)		XXX

Financial Ratios

The arithmetical relation between two figures is known as ratio. It can be expressed either in proportion or in percentage or in times. Ratio analysis is a technique of analysis and interpretation of financial statement. To evaluate the performance of an organization by creating the ratio from the figure a different account consisting in income statement and balance sheet is known as ratio analysis. Ratio analysis involve the following steps:

1. Calculation Ratios
2. To compare the calculated ratio with

(a) The ratio of same firm in the past.
(b) Industry average ratio i.e. standard ratio.
(c) Ratio of other companies

3. Interpretation and evaluation the ratio.

Use of Ratio Analysis

1. Helpful in financial forecasting and planning
2. Helpful for effective control.
3. Helpful for comparing efficiency.
4. Helpful for decision making.
5. Helpful in assessing, Liquidity, solvency, turnover ratio and profitability position.
6. Helpful in assessing the firm's strengths and weaknesses.

Limitation or Drawback of Ratio analysis

1. Lack of proper basis for comparison.
2. A single ratio in its self is not important.
3. It is related with quantitative analysis. It ignores qualitative analysis.
4. Window dressing
5. Difficult to forecast future on the basis of part.
6. Give false results if based on false data.

Types of Financial Ratios

1. Liquidity Ratios
2. Assets Management Ratios
3. Leverage Ratios
4. Profitability Ratios
5. Market Value Ratio

Liquidity Ratios

Liquidity ratios are associated with firm's current assets and current liability figures. These ratios calculated to know firm's ability for meeting short term expenses and paying current liabilities. In fact liquidity ratios show relative study of current assets and current liabilities that shows whether the firm has sufficient current assets or not to meet current liabilities and operating expenses. Current ratio and quick ratio are calculated for this purpose.

i. Current Ratio

Current ratios are mathematical relation of current assets and current liabilities. The assets which can be converted into cash with a year are known as current assets, whereas liabilities that should paid within a year are current liabilities. This ratio express firm's current liability meeting capacity out of its current assets. High current ratio indicates better liquidity position and vice-versa. Generally, if current ratio is more than or equal to two times, it is said at satisfactory level.

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$$

ii. Quick Ratio or Acid Test Ratio or Liquid Ratio

This ratio shows relationship between firm's quick assets and current liabilities. In other word, it shows firm's current liabilities paying capacity out of quick assets. The current assets except inventory are quick assets. They are comparatively converted into cash faster than inventory. High quick ratio indicates better liquidity position and vice-versa. Generally if quick ratios are more than 1 times, it is said at satisfactory level.

Quick Assets = Cash + marketable securities + receivable

Quick Assets = Current assets – Closing stock or inventory – Prepaid expenses

$$\text{Quick Ratio} = \frac{\text{Quick Assets or Liquid Assets}}{\text{Current Liabilities}}$$

Illustration 1

Monika Corporation has current assets of Rs.500,000 out of which prepaid expenses and inventory consists of Rs. 125,000. It has total current liabilities of Rs.200,000.

Required:

i. Current ratio

ii. Quick ratio

Solution:

i. $\text{Current ratio} = \frac{\text{Current assets}}{\text{Current liabilities}} = \frac{\text{Rs.500,000}}{\text{Rs.200,000}} = 2.5 \text{ times}$

ii. Quick assets = Current assets - Inventory- Prepaid expenses

= Rs 500,000 – Rs.125,000 = Rs 375,000

$\text{Quick ratio} = \frac{\text{Quick assets}}{\text{Current liabilities}} = \frac{\text{Rs.375,000}}{\text{Rs.200,000}} = 1.875 \text{ times}$

Illustration 2

PP Company has current assent of Rs 1.million and current liabilities of Rs 600,000.

a. What is the company's current ratio?

b. What would be its current ratio if each of the following occurred, holding all other things constant?

i. A machine costing Rs100, 000 is paid for with cash.

ii. Inventories of Rs 120,000 are purchased and financed with trade credit**.**

iii. Accounts payable of Rs 50,000 are paid off with cash

iv. Accounts receivable if Rs 75,000 are collected.

v. Long term debt of Rs 200,000 is raised for investment in inventories (Rs. 100,000 and to pay down short –term borrowings (Rs 100,000).

Solution:

Current assets =Rs 1,000,000

Current liabilities =Rs 600,000

a. Current ratio = $\frac{\text{Current Assets}}{\text{current Liabilities}} = \frac{\text{Rs } 1,000,000}{\text{Rs } 600,000} = 1.67:1$

b. i. . Current ratio = $\frac{\text{Current Assets}}{\text{current Liabilities}} = \frac{\text{Rs } 1,000,000 - \text{Rs}100,000}{\text{Rs } 600,000} = 1.5:1$

ii. Current ratio = $\frac{\text{Current Assets}}{\text{current Liabilities}} = \frac{\text{Rs } 1,000,000 + \text{Rs } 120,000}{\text{Rs } 600,000 + \text{Rs}120,000} = 1.56:1$

iii. Current ratio = $\frac{\text{Current Assets}}{\text{current Liabilities}} = \frac{\text{Rs } 1,000,000 - \text{Rs } 50,000}{\text{Rs } 600,000 - \text{Rs } 50,000} = 1.73:1$

iv: Current ratio = $\frac{\text{Current Assets}}{\text{current Liabilities}} = \frac{\text{Rs } 1,000,000 + \text{Rs } 75,000 - \text{Rs } 75,000}{\text{Rs } 600,000} = 1.67:1$

v. current ratio = $\frac{\text{Current Assets}}{\text{current Liabilities}} = \frac{\text{Rs } 1,000,000 + \text{Rs } 100,000}{\text{Rs } 600,000 - \text{Rs } 100,000} = 2.20:1$

Assets Management Ratios

These ratios are also known as efficiency ratios or activities ratios or performance ratios. Such ratios measures how efficiently the overall assets of organization being utilized. In other words, these ratios measures productivity of assets employed in the organization. If assets are not properly utilized it affects profitability of the organization. So, firm should make proper investment in various assets. Excess or useless investment in any asset decreases the overall profitability and efficiency.

i. Inventory Turnover Ratio

Inventory turnover ratio measures how efficiently, the inventory is managed to generate sales. If firm has higher investment in inventory and sales is not at proper level it reflects more cash tied with investment, which is known less utilization of inventory. So, proper level of inventory should carry to maintain liquidity and achieve target level of sales. Inventory turnover ratio can achieve target level of sales. Inventory turnover ratio can be calculated on the basis of sales and cost of goods sold.

Inventory turnover ratio $= \frac{\text{Cost of Goods Sold}}{\text{Average Inventory}}$

$$\text{or } \frac{\text{Cost of goods sold}}{\text{Closing Inventory}}$$

$$\text{or } \frac{\text{Sales}}{\text{Closing Inventory}}$$

If inventory turnover ratio is higher it indicates firm is turning more or level of sales is higher. A lower inventory turnover indicates firm is not turning inventory properly or lower degree of sales. Keeping excess inventory is not beneficial if sales turnover is lower. So firm should try to attain higher inventory turnover ratio. The lower turnover shows useless investment in investment.

ii. Days Sales in Inventory

It is also known as age of inventory or inventory conversion period. Day's sales in inventory mean how much time the firm takes to sell inventory from store.

$$\text{Days Sales in inventory} = \frac{\text{Days in a year}}{\text{Inventory turnover ratio}}$$

Lower days sales in inventory indicates firm is efficient for selling inventory or it indicates inventory sit in store lower period before it was sold.

iii. Receivable Turnover Ratio

Receivable turnover ratio is also known as Debtor turnover ratio. The term receivable is created when firm makes sales on credit. The receivable turnover ratio shows how many times firm collect its credit sales in a year. This ratio measures attitude of debtors to pay for credit purchase as well as investment in receivable to generate sales. Keeping more receivable account indicates useless investment in receivable and possibility of default by the customers.

$$\text{Receivable turnover ratio} = \frac{\text{Annual credit sales}}{\text{Average or closing accounts receivable}}$$

If receivable turnover ratio is higher it shows firm is efficient for collecting credit sales where as lower ratio shows firm is not efficient in collecting credit sales. So, firm should keep account receivable balance according to collection capacity.

iv. Average Collection Period

Average collection period is also known as days sales outstanding and receivable conversion period. It shows time taken by the firm to collect account receivable. The average collection period reflect efficiency of collecting cash on credit sales. So, it is length of time between making credit sales of collecting cash. Firm should try to minimize collection period for maintaining liquidity as well as protect from default in collection.

$$\text{Average Collection Period} = \frac{\text{Account receivables} \times \text{Days in a year}}{\text{Annual credit sales}}$$

Or,

$$= \frac{\text{Days in a year}}{\text{Receivable turnover ratio}}$$

If average collection period is lower it indicates firm is able to collect credit sales rapidly or customers are paying their credit purchases in time. Whereas, if collection period is higher the firm is unable to collect credit sales in time or customers are paying their credit purchase late. So, firm should able to make proper collection policy according to nature of customers.

v. Fixed Assets Turnover Ratio

Fixed assets of the firm are directly related with production activity or process. Land and Building, Plant and Machinery are the fixed assets employed in generating production or sales. The Fixed assets turnover ratio shows how efficiently fixed assets of an organization being utilized to increase sales. This is an important analysis because fixed assets require making large investment of the firm.

$$\text{Fixed Assets turnover ratio} = \frac{\text{Sales}}{\text{Net Fixed asset}} = \ldots.times$$

Where, Net Fixed Assets = Fixed assets - Depreciation

If Fixed asset turnover ratios is higher it shows firm utilizing its fixed assets in proper level whereas if ratio is lower it shows firm is weak in utilizing fixed assets to achieve growth in sales.

vi. Total Assets Turnover Ratio

Total assets turnover ratios are the measurement of overall asset utilization of the firm. It shows how efficiently the assets of an organization are used to generate sales. This is one of the important ratios to measure organizational efficiency.

$$\text{Total Assets Turnover Ratio} = \frac{\text{Sales}}{\text{Total assets}} = \ldots.times$$

If total assets turnover ratio is higher it shows overall assets of an organization are properly utilized to attain optimum level of sales where as lower ratio indicates the assets are not efficiently utilized.

Leverage Ratios

These ratios are also known as debt management ratios or capital structure ratios. Leverage ratios measures level of debt capital used by the firm. In other word, debt management ratios indicates how much assets are purchased by debt capital furthermore these ratios shows relative comparison with equity, capital interest, paying capacity of the firm.

i. Debt Ratio

Debt ratio is also called as debt to asset ratio. This ratio shows how much assets are purchased using debt capital. In other words, debt ratio indicates proportion of debt capital used by firm out of total capital.

$$\text{Debt Ratio} = \frac{\text{Total Debt}}{\text{Total Assets}}$$

The total debt is mixture of long-term debt and current liabilities, where long term debt contains bond, debentures, and long term loans. If debt ratio is higher firm should bear large amount of interest regularly and creditors feel risky for receiving interest and their investment. If ratio is lower firm has lower interest burden and creditors feel secure. But if firm has sufficient earning regularly use of more debt capital is beneficial to equity shareholders due to fixed interest payment to creditors.

ii. Debt to Equity Ratio

Debt to equity ratio shows long term solvency of the firm. It is relative comparison ratio between debt and equity capital showing proportionate claim of creditor and equity shareholder on firm's total asset.

$$\text{Debt to equity ratio} = \frac{\text{Total Debt}}{\text{Total equity}}$$

Total equity is also known as net worth of firm. Total equity contains common stock, retained earnings, additional paid in capital, reserve and surplus. If debt to equity ratio is higher it shows more funds are provided by debt holder as compare to equity shareholder. Generally, debtor prefers use of lower debt capital by the firm for their security on receiving interest and principle.

iii. Long-term debt to Asset Ratio

Long term debt to asset ratio shows relationship between long-term debt capital and total asset of the firm. It represents how much asset of firm are purchased using long term debt capital.

$$\text{Long term Debt to Assets Ratio} = \frac{\text{Long Term Debt}}{\text{Total assets}} = \%$$

If long term debt to assets ratio is higher, it reflects firm has more long term debt. Generally, interest rate on long term debt is higher which regular expenses are for a firm. So, firm should use long term debt capital according to earning capacity.

iv. Equity Multiplier

Equity Multiplier shows relationship between equity capital and total assets of the firm. IT is also known as leverage factor. Equity multiplier measures how much assets of firm are purchased by the equity capital. In other words, it reflects how much asset available for each rupee of equity capital.

$$\text{Equity Multiplier} = \frac{\text{Total Assets}}{\text{Total Common Equity}} = \frac{1}{1 - \text{debt ratio}}$$

If equity multiplier is higher it indicates firm has more financial risk caused by debt capital. High value of equity multiplier shows lower equity capital used in the firm as compare to debt capital. If debt capital is higher there is always interest payment burden which is financial risk of the firm.

v. Interest Coverage Ratio

This ratio is also known as time interest earned ratio. Interest coverage ratio measures interest servicing capacity of the firm. Furthermore it measure level of operating profit to cover regular interest expenses. It is an important ratios used by financial institutions for their customers business evaluation and loan renew process.

$$\text{Interest Coverage Ratio or Times Interest Earned (TIE) ratio} = \frac{\text{EBIT}}{\text{Interest Expenses}}$$

If interest coverage ratio is higher it shows firm has sufficient operating profit (EBIT) to pay interest expenses and vice versa. So, firm should try to maintain this ratio at proper level by either increasing level of profit or minimizing debt capital at proper level in order to prevent from risk.

Profitability Ratios

Profitability ratios are measurement of earning in relation to sales, assets and capital used. Profitability ratios indicate overall performance of the firm. These ratios are important measurement for management prospective, shareholders, creditors and other stakeholders. These ratios are outcome of assets management, debt management and managerial efficiencies. So, these ratios are final measurement of business performance.

i. Net Profit Margin

Net Profit Margin is the measurement of net profitability on the basis of sales. Furthermore it indicates net income per rupee of sales. This is most common ratio widely used by every business firm.

$$\text{Net Profit Margin} = \frac{\text{Net income}}{\text{Sales}} = \%$$

Net income is also known as profit after tax or earning after tax or earning available to equity shareholder. Higher of this ratio shows organizational success and vice versa.

ii. Gross Profit Margin

Gross profit margin is the measurement of gross profitability with respect to sales. Gross profit is the difference between sales and cost of goods sold.

$$\text{Gross Profit Margin} = \frac{\text{Gross Profit}}{\text{Sales}} = \%$$

Higher gross profit margin ratio indicates higher capacity to meet expenses of the firm. So, firm try to attain high gross profit margin ratio to sustain long run.

iii. Operating Profit Margin

Operating profit margin ratio is the measurement of operating efficiency of the firm. It is the measurement of operating profitability with respect to sales.

$$\text{Operating Profit Ratio} = \frac{\text{EBIT}}{\text{Sales}} = \%$$

Higher the ratio is better and shows firm has sufficient profit to meet interest payment, tax payment and dividend payment.

iv. Basic Earning Power Ratio

Basic earning power ratio is the measurement of operating profitability with respect to total assets. It shows generation of EBIT by the firm's asset.

$$\text{Basic Earning Power Ratio} = \frac{\text{EBIT}}{\text{Total Assets}} = ...\%$$

If the ratio is higher it shows productivity if assets utilization is higher and vice versa.

v. Return on Assets

It is also known as earning power ratio. Return on asset measurement of net profit in relation to total assets. IT is an important ratio to measure efficiency of firm. Firm can achieve higher ratio by proper utilization of overall assets.

$$\text{Return on Assets} = \frac{\text{Net Income}}{\text{Total Assets}} = ...\%$$

Higher of this ratio is better and vice versa.

Return on Equity

Return on equity is the measurement of profitability for shareholder of company. It is calculated by using net income and total equity capital. Company always try to maximize the return on equity because equity shareholder are owner of the company.

$$\text{Return on Equity} = \frac{\text{Net Income}}{\text{Total Equity}} = ...\%$$

Higher the ratio is better to maximize shareholder benefit. Increasing trend of return on equity leads to maximize price of share.

Market Value Ratios

These ratios show relations between market price per share, book value per share and earnings per share. Market value ratio shows determination of market price per share on the basis of earning per share and price earnings ratio.

i. Price Earnings Ratio

Price earnings ratio is also known as theoretical multiplier. The ratio indicates price paid by the investor for each rupee of earnings. Price of share depends upon earnings

per share of the firm to some extent. So, investor commonly considers this ratio at the time of investment.

$$\text{Price Earnings Ratio} = \frac{\text{MPS}}{\text{EPS}} = ...times$$

Increasing trend of price earnings ratio is beneficial for shareholders which lead to maximize stock price.

ii. Market to Book Ratio

It is the relative between comparison between market price of share and book value per share. Book value per share shows actual value determined on the basis of shareholder equity account but market value per share is determined in market place. It shows how much market price is far from book value of share.

$$\text{Market to Book Ratio} = \frac{\text{MPS}}{\text{BVPS}}$$

Higher of this ratio is better for shareholders. Market value of share is increased through overall performance of the company. The book value per share can be calculated dividing total equity by total no. of shares outstanding.

iii. Earnings per share

The income per common share is called earning per share. The earning per share is calculated net income after taxes less preferred dividend divided by total number of common shares. It is computed as follows:

$$\text{Earnings per share (EPS)} = \frac{\text{Earning available to equity share}}{\text{Number of common shares outstanding}}$$

Earnings available to equity share = Net profit after tax – Preferred dividend

Higher earnings per share is preferable. It indicates earning power of equity share is strong.

iv. Dividend per share

Dividend per share is an amount of net income of the firm which is paid to per equity share. It is computed total dividend paid to equity shares dividing by number of common share.

$$\text{Dividend per share} = \frac{\text{Dividend paid to equity shareholders}}{\text{Number of equity shares}}$$

v. Earning yield ratio

Earning yield ratio shows the relationship between the earning per share and market price per share and it can be calculated as follows:

$$\text{Earning yield ratio} = \frac{\text{Earning per share}}{\text{Market price per share}}$$

vi. Dividend yield ratio

Dividend yield ratio shows the relationship between dividend per share and market value per share. It is very useful for the investors to know the regular yield on the current market price of share. It is computed as follows:

$$\text{Dividend yield ratio} = \frac{\text{Dividend per share}}{\text{Market value per share}}$$

vii. Dividend payout ratio

The ratio is the relationship between dividend per share (DPR) and earning per share (EPS). It is the proportion of net income which is distributed to its common shareholder. It is calculated dividend per share dividing by earning per share.

$$\text{Dividend payout ratio} = \frac{\text{DPS}}{\text{EPS}}$$

Du-Pont Analysis

Du-Pont analysis is another method of financial analysis propounded by Du-Pont Corporation of USA. This analysis is summary measure of profitability ratios, turnover ratios and debt management ratios for financial analysis and controlling process. The earning power (Return on assets) shows the combined effect of net profit margin and total assets turn over. Du point system shows the relationship between return on assets, Net profit margin and total assets turn over. A change in net profit margin and total assets turnover will change the firms earning power. The net profit margin times the total assets turnover is return on assets. It is called Du point equation. It can be written as follows:

Return on Assets = Net Profit Margin × Total Assets Turnover

If the company has used only equity, return on equity is equal to return on assets. But when debt capital is used, return on assets must be multiplied by equity to find out return on equity. The expended Du point equation can be written as follows:

Return on equity = Return on Assets × Equity Multiplier

Return on Equity = Net profit margin × Total asset turnover × Equity multiplier

Where,

$$\text{Equity multiplier} = \frac{\text{Total assets}}{\text{common equity}} \qquad \text{Or,} \qquad \frac{1}{1 - \text{Debt ratio}}$$

Finally, the Du-Pont analysis is the another approach of determining return on assets and return on equity using profitability ratios, assets management ratio and leverage ratios.

Unit 3
Security Valuation

Valuation

Valuation is a process of determining the present value of share, debenture and other investment securities. It refers to the general process of determining the present worth of an asset. The value of any asset is the present value of all future cash flows. Therefore, it is determined by discounting the expected cash flows to the present values with appropriate discounting rate. Value of an asset can be determined by using the following equation.

$$\text{Value of an asset} = \frac{CF_1}{(1+k)^1} + \frac{CF_2}{(1+k)^2} + \ldots\ldots\ldots\ldots + \frac{CF_n}{(1+k)^n}$$

Where, CF = Cash flow expected at the end of year
K = Appropriate discounting rate
n = time period

Bonds

Bond is defined as the long term promissory note, on which the issuer is promising to pay a fixed coupon interest periodically and the maturity or face value or principal at the end of a certain maturity period. It is a debt certificate used and issued to raise debt capital by corporations. Generally, a bond carries a fixed interest that is paid periodically over the maturity period and the amount that is paid periodically is known as coupon or interest. In addition to the coupon a stated amount or principal is repaid at the end of the maturity or when required as per the bond indenture and the amount that is paid on maturity date is known as face or par value.

Bond is a debt certificate issued to raise long term debt capital by an issuer. The issuers of a bond can be government, corporations, local government and foreign government and corporations. By based on the issuers the bonds can be classified into the different types: treasury bonds, corporate bonds, municipal bonds and foreign bonds. Treasury bonds are the bonds typically issued by a central government to fulfill the requirement of funds to the government and are also known as government bonds. Corporate bonds are those bonds which are issued by corporations to meet their financial requirements. Municipal bonds are those bonds which are issued by local government bodies, such as municipalities, metropolitans, etc. Foreign bonds are issued by foreign government and non-government organizations. As fixed income security bond has various features. These features are explained here under.

i. Coupon interest rate: The stated interest rate that is to be paid periodically over the maturity period of a bond is known as the coupon interest rate or face interest rate or interest rate. Bond is a fixed income security providing a fixed income to the investors. The fixed amount that is paid on bond contract is the coupon. In general, the coupon rate is determined at the time of issuing bonds along with the mode of payments and remains constant over the maturity period regardless of the change in market interest rate.

Annual interest (I) = Coupon interest rate × Par value

ii. Par value: The par value is a stated value of bond and it generally represents the amount or money that a firm borrows and promises to repay on the maturity date. Thus, the value is also known as the maturity value or principal or face value. Usually, the par value of a bond is set at Rs 1000. Par value is the amount that the issuer accepts as obligation for each bond and promises to repay in future or on maturity to the holder. Par value is important to determine the coupon amount because the coupon rate is stated on the par value of bond and equally plays the role in determining the market value of the bond.

iii. Maturity: In general, the bonds are issued with a fixed maturity date. The date specified for redemption of bonds is known as maturity date. It is the date on which the principal or face value of bond is repaid by issuer and the debt contract expires. The time interval between issue date and the maturity date is the original maturity of bond and the remaining period for the retirement of bond is known as time to maturity. The time to maturity declines as the bond approaches to the maturity date. In general, the bonds cannot be redeemed before the maturity date.

iv. Indenture: A legal document which discus about the terms and conditions of the bond issue. Usually, indenture includes coupon interest rate and mode of payment, maturity date and terms of principal repayment, call provision, call price, call period,

trustee and its roles & responsibilities, covenants, etc. The indenture is a formal document that is prepared at the time of bond issue and describes the right and responsibilities of both lenders and borrowers. Covenants or debt covenants are the restrictions that are placed by the lenders to the borrowers to protect their interest and to minimize the moral hazards along with the agency conflict between creditors and shareholders.

v. **Call provision:** In general, a bond cannot be redeemed before its maturity period. Call provision is the special provision that provides the rights to the issuers of bonds to call the bonds for redemption before their maturity date. It is a clause that makes easy to retire the bonds at specified period before its maturity date. The bonds having call features are known as the callable bonds. In the case of callable bonds, the call price, call period and mode of payment all are guided by indenture. Call price is the amount that is to be repaid to the bond holders at the time of early retirement. Generally, the call price is set at the value greater than par value and the excess amount of call price over the par value is known as the call premium.

Call price = Par value + Call premium

vi. Trustee

Trustee is the institution or a group who represents the large number of bondholders and acts in favors of bondholders. A trustee is a financial intermediary who works as a mediator between issuer and holders of bonds. Usually, a commercial bank or any other financial institution is appointed as trustee and acts on behalf of bondholders. Trustee is responsible for effective implementation of the terms and conditions of bond issue.

vii. Sinking fund

Sinking fund is a special provision made by bond indenture which facilitates the availability of funds at the time of retirement of bonds. It is the provision made for retirement of debt outstanding. A sum of money is separated as sinking fund and then is invested in to different areas and the accumulated amount from the investment is then used for serial or lump sum retirement of bond. The trustee is responsible for the management of the amount separated as sinking fund.

Bond Pricing / Finding the value or price of bond

Bond pricing refers to the process of finding equilibrium price of the bond by discounting its future cash flow. Equilibrium price is also known as actual value or present value. So, an appropriate risk adjusted cost rate is used as discounted rate under capitalization of income method to value the bond.

Valuation of Perpetual/Irredeemable bond

The bonds which never mature are called perpetual bond. The value of perpetual bonds is simply the present value of coupon interest expected to pay for indefinite period. Perpetual bonds are also known as irredeemable bonds and the value of these bonds is calculated as follows:

$$V_d = \frac{I}{K_d}$$

$$K_d = \frac{I}{V_d}$$

Where,

V_d = Value of bond

I = Annual interest amount

K_d = Yield an debenture or bonds/require rate of return/ cost of debt /Market interest rate

Illustration 1

The bonds of the Rolex Company are perpetuities with a 10% coupon. Bond of this type currently yields 12 percent, and their par value is Rs 1,000.

a. What is the price of the Rolex bonds?
b. Suppose interest rate levels are to the point where such bonds now yield 8 percent what would be the price of the Rolex bonds?
c. At what price would the Rolex bonds sell if the yield on their bonds were 10 percent?

Solution:

Given,

a. Par value (MV) = Rs 1,000

Coupon rate = 10%

Annual interest (I) = Coupon interest rate × Par value =0.10 × 1,000= Rs. 100

Yield on bond (k_d) = 12%

Price of bond (v_d) = $\frac{I}{K_d} = \frac{100}{0.12}$ = Rs 833.33

b. Bond yield (k_d) = 8%

$$Vd = \frac{I}{K_d} = \frac{100}{0.08} = \text{Rs } 1,250$$

c. bond yield (k_d) = 10%

$$Vd = \frac{I}{K_d} = \frac{100}{0.10} = \text{Rs } 1,000$$

Valuation of redeemable bonds

Maturity or finite maturity bonds are the bonds having a fixed coupon rate with fixed maturity period. Maturity bonds are those bonds on which investors are paid periodically with a fixed coupon interest over maturity period and they are repaid with the maturity or face value on maturity date. Thus, the type of bonds is also known as the redeemable bonds are redeemed by the end of maturity date.

$$V_d = I \times PVIFA_{kd, n} + MV \times PVIF_{kd, n}$$

Or,

$$V_d = I \times \left[\frac{1 - \frac{1}{(1 + K_d)^n}}{K_d}\right] + MV\left[\frac{1}{(1 + K_d)^n}\right]$$

Where,

MV = Maturity value

n = Maturity period

Note: If debenture is semiannual compounding, divide I and K_d by 2 and multiply n by 2.

Illustration 2

Himalayan Motors' bonds have 10 years remaining to maturity. Interest is paid annually; the bonds have a Rs 1,000 par value, and the coupon interest rate is 8 percent. The bonds have a yield to maturity of 9 percent. What is the current market price of these bonds?

Solution:

Given,

Par value (MV) = Rs 1,000

Coupon rate = 8%

Annual interest (I) = Coupon interest rate × Par value =0.08 × 1,000= Rs. 80

Yield on bond (k_d) = 9%

Maturity period (n) =10 years

$V_d = I \times PVIFA_{kd, n} + MV \times PVIF_{kd, n}$

$= 80 \times PVIFA_{9\%, 10} + 1{,}000 \times PVIF_{9\%, 10}$

$=80 \times 6.4177 + 1000 \times 0.4224 = Rs.\ 935.82$

Illustration 3

GEC has a 10 percent bond issue with a face value of Rs.1,000 per bond and three years to maturity. Interest is payable semi-annually. In current market conditions, the bonds should provide the yield of 12 percent. What will be price of the bonds?

Solution:

Given,

Par value (MV) = Rs 1,000

Coupon rate = 10%
Annual interest (I) = Coupon interest rate × Par value =0.10 × 1,000= Rs. 100
Yield on bond (k_d) = 12%
Maturity period (n) =3 years

$$Vd = \frac{I}{2} \times PVIFA_{kd/2, 2n} + MV \times PVIF_{kd/2, 2n}$$

$= 50 \times PVIFA_{6\%, 6} + 1{,}000 \times PVIF_{6\%, 6}$
$= 50 \times 4.9173 + 1{,}000 \times 0.7050$ = Rs 950.87

Valuation of Zero coupon bonds

The bonds having no coupon payments over the life but the maturity value is repaid at the end of maturity period and initially issued at a discounted price are known as zero coupon bonds.

$$V_d = MV \times PVIF_{Kd, n} \quad Or, \quad MV\left[\frac{1}{(1 + K_d)^n}\right]$$

$$Kd = \left[\frac{MV}{V_d}\right]^{1/n} - 1$$

Where,

K_d = yield on debenture
MV = Maturity value
n = Maturity period

Illustration 4

Compute value of the following bonds:
10-years Rs. 1,000 zero coupon bonds. The required rate of return on the bond is 12 percent.

Solution:

Given,
Par value (MV) = Rs 1,000
Coupon rate = Nil
Yield on bond (k_d) = 12%

$V_d = MV \times PVIF_{Kd, n}$
$= MV \times PVIF_{Kd, n}$
$= 1{,}000 \times PVIF_{12\%, 10} = 1{,}000 \times 0.3220$ = Rs. 322

Value of Callable Bonds

Callable bonds can be defined as the bonds having a call provision. Call provision is the special provision that provides the rights to the issuers of bonds to call the bonds for redemption before their maturity date. In the case of callable bonds, the issuer is allowed to call the bonds for early redemption by paying the value in excess over the

par value. The amount paid at the time of early retirement of bonds is known as call price. Commonly, the call price should exceed the par and the amount paid in excess of par or maturity value is known as call premium. The value of these bonds is present value of coupon amounts over call period and call price. The model for valuation of these bonds is given as:

$$V_d = I \times PVIFA_{kd\%, n} + \text{Call price} \times PVIF_{kd\%, n}$$

$$V_d = I \times \left[\frac{1 - \frac{1}{(1 + K_d)^n}}{K_d}\right] + \text{Call price}\left[\frac{1}{(1 + K_d)^n}\right]$$

Where,

n =Years to call

Call price = face value + call premium

Illustration 5

A Corporation issued 10 year, 12 percent bonds with a par value of Rs 1,000. Bonds may be called in 4 years at a call price of 106 percent (i.e. Rs. 1,060). The investor's required rate of return is 10 percent. Calculate the value of bond if it is called at the end of 4 year.

Solution:

Given,

Par value (MV) = Rs 1,000

Coupon rate = 10%

Annual interest (I) = Coupon interest rate × Par value =0.12 × 1,000= Rs. 120

Call price = Rs. 1,060

Yield on bond (k_d) = 10%

Year to call (n) =4 years

$$V_d = I \times PVIFA_{kd\%, n} + \text{Call price} \times PVIF_{kd\%, n}$$

$$= 120 \times PVIFA_{10\%, 4} + \text{Call price} \times PVIF_{10\%, 4}$$

$$= 120 \times 3.1699 + 1,060 \times 0.6830 = 380.39 + 723.98 = \text{Rs } 1104.37$$

Bond Pricing and Investment Decision

Among others, prime objective of bond valuation is to determine the equilibrium price of the bond and find out whether the bond is overvalued and undervalued. Upon the calculation of current intrinsic value, it should be compared with the market price of the bond to take buy/sell decision. If market price of the bond is less than the present value, it is assumed as the underpriced, and better to buy or to hold long position. But if the market price is more than this value then is assumed as the overpriced and better to sell or to hold short position.

YTM and value of bond

1. If yield to maturity (Kd) or market interest rate is equal to coupon interest rate, value of bond is equal to par value.
2. If yield to maturity or market interest rate is more than coupon interest rate, value of bond is less than par value i.e. the bond is discount bond.
3. If yield to maturity or market interest rate is less than coupon interest rate, value of bond is more than par value i.e. the bond is premium bond.

Bond Prices over the time

Bonds may be issued at premium, discount and par. If the coupon rate is greater than the YTM the value of the bond tends to be more than the face value, such bond is defined as the premium bond. Inversely, if the coupon rate is lower than the YTM, the value of the bond tends to be less than the face value. Such bond is defined as the discount bond. If the coupon rate equals to YTM, the value of the bond always equals to its face value. Such bond is defined as the par bond. Over the passage of time, the prices of these bonds behave differently even if required rate of return remains constant.

- If the bonds are issued at discount (discount bonds), the price of bonds gradually increases and is equal to par value when it is approaches to maturity.
- If the bonds are issued at premium (premium bonds), the price of bonds gradually decreases and is equal to par value when it is approaches to maturity.
- Whether bonds are issued at par or at premium or at discount, the price of bond is equal to par value when it is approaches to maturity.

Bond Return Measures

The return realized from the investment on bonds is known as bond yields. It is an actual return realized from the bonds in the different economic environment. Generally, the bond yields or returns can be measured as current yield, capital gain yield, yield to maturity (YTM) and yield to call (YTC).

Current yield

Current yield is simply the coupon interest payment of bond divided by the current price of bond. It is also called interest rate yield or coupon yield. This is a part of total return of bond. Current yield can be calculated by using following equation.

$$\text{Current yield} = \frac{I}{Vd}$$

Capital gain yield

It is the rate of return which is obtained from the appreciation of market price of bond. Capital gain yield may be negative if the market price of bond declines. It can be calculated by subtracting the current yield from the total yield of bond (YTM).

Capital gain yield = Total yield (YTM) – Current Yield

Capital gain yield = $\frac{Vd_1 - Vd_0}{Vd_0}$

Yield to maturity (YTM)

Yield to maturity is the total rate of return realized from the bond investment which is hold until its final maturity. It can be defined as that rate of return which equates the present value of future cash flow received from bond investment and current market price of bond. To find the yield to maturity of a bond first we have to calculate approximate yield to maturity using following equation:

$$Kd = \frac{I + \frac{MV - Vd}{n}}{\frac{MV + 2Vd}{3}}$$

Where,

I = Coupon or interest amount

MV = Maturity value

V_d = Current price of the bond or value of bond

n = Number of years to maturity

Actual yield to maturity is calculated by trial and error method using the following equation.

Vd = I × PVIFA Kd, n + MV + PVIF Kd, n

Vd at low rate must be more than price of the bond and Vd at high rate must be less than price of the bond.

$$\text{Actual YTM} = LR + \frac{V_d \text{ at LR} - V_d}{V_d \text{ at LR} - V_d \text{ at HR}} \times (HR - LR)$$

Yield to Call

If the bonds have call provision that bond may be redeemed by the issuer before the maturity date. Yield to call is the rate of return that is earned by a investor which is called before the maturity date. Following formula is used to calculate YTC.

$$Kd = \frac{I + \frac{\text{Calls price} - Vd}{n}}{\frac{\text{Calls Price} + 2\ Vd}{3}}$$

Actual yield to call can be calculated by trial and error using the following equation.

$Vd = I \times PVIFA_{Kd, n} + \text{Calls price} \times PVIF_{Kd, n}$

$$\text{Actual YTC} = LR + \frac{V_d \text{ at LR} - V_d}{V_d \text{ at LR} - V_d \text{ at HR}} \times (HR - LR)$$

Preferred Stock Valuation

Preferred stock is fixed income security having some characteristics of debt and sum of common stock. In one hand, preferred stock is like bond because its dividend income is fixed. In another hand, it is like common stock which has ownership of the company, reward is given in the form of dividend which is paid from after tax-income. Nonpayment of preference dividend does not force the company in to bankruptcy. Therefore, it is known a hybrid security which is issued by the firm for long term financing.

Preferred stock valuation is the process of determining present value or intrinsic value of preferred stock. Intrinsic value of the preferred stock is the present value of expected future cash flows from the preferred stock discounted at appropriate required rate of return of the preferred stock. For the valuation purpose, preferred stock can be classified as perpetual preferred stock and redeemable preferred stock. The preferred stock issued without maturity period is called irredeemable or perpetual preferred stock and the preferred stock issued with fixed maturity period is called redeemable preferred stock. Redeemable preferred stock should be repaid after fixed maturity period. Repayable amount is called par value or maturity value.

Valuation of perpetual (irredeemable) preferred stock

The preferred stock which has no fixed maturity period but fixed dividend amount is paid periodically is known as perpetual or irredeemable preferred stock. Intrinsic value of perpetual preferred stock can be calculated as follows:

$$V_P = \frac{D_P}{K_P}$$

Where,

V_P = Price of preferred stock or value of preferred stock.

D_P = Annual preference dividend = Par value × Coupon rate

K_P = Required rate of return on preferred stock or yield on preferred stock or cost preferred stock.

Illustration 1

Everest Bank limited sold 12 percent preferred stock with a par value of Rs 100. The required rate of return on preferred stock is 10 percent. What is the intrinsic value of the preferred stock?

Solution

Preferred stock dividend (D_p) =12 % of Rs 100 =Rs 12

Required rate of return on preferred stock (K_p) = 10%

Value of preferred stock (V_p) =?

Value of the preferred stock (V_p) = $\frac{D_p}{k_p} = \frac{Rs\ 12}{0.10}$ = Rs 120

Therefore, intrinsic value of the preferred stock is Rs 120.

Valuation of Redeemable preferred stock

The preferred stock issued with fixed maturity period is called redeemable preferred stock. The value of the redeemable preferred stock is the sum of present value of its dividend payment and present value of maturity value or redeemable value. Intrinsic value of preferred stock can be calculated as follows:

$$Vp = D_P \times PVIFA_{Kp, n} + MV \times PVIF_{Kp, n}$$

$$V_P = D_P \times \left[\frac{1 - \frac{1}{(1 + K_P)^n}}{K_P}\right] + MV\left[\frac{1}{(1 + K_P)^n}\right]$$

Where,

V_P = Price of preferred stock or value of preferred stock.

D_P = Annual preference dividend = Par value × Coupon rate

K_P = Required rate of return on preferred stock or yield on preferred stock or cost of preferred stock.

n = years to maturity

MV = Maturity value/Par value

Illustration 2

Bagmati Textile Company issues 9 percent dividend preferred stock of Rs 100 par value with 5 years maturity period. The required rate of return on preferred stock is 10 percent. What is the value of the preferred stock?

Solution

Preferred stock dividend (D_p) = 9% of Rs 100 = Rs 9

Required rate of return on preferred stock (k_p) = 10%

Maturity value of preferred stock (MV) = Rs 100

Years to maturity (n) = 5 years

Value of preferred stock (V_p) = ?

$V_p = D_P \times PVIFA\ Kp, n + MV \times PVIF\ Kp, n$

$= 9 \times PVIFA_{10\%, 5} + 100 \times PVIF_{10\%, 5}$

$= 9 \times 3.7908 + 100 \times 0.6209$ =Rs 96.21

Therefore, value of the preferred stock is Rs 96.21

Valuation of Redeemable preferred stock with call provision

The redeemable preferred stock issued with call provision is known as callable preferred stock. The value of preferred stock with call provision can be calculated as follows:

$V_p = D_P \times PVIFA_{Kp, n} + \text{Call price} \times PVIF_{Kp, n}$

$$V_P = D_P \times \left[\frac{1 - \frac{1}{(1 + K_P)^n}}{K_P}\right] + \text{Call price} \times \left[\frac{1}{(1 + K_P)^n}\right]$$

Where,

V_P = Price of preferred stock or value of preferred stock.

D_P = Annual preference dividend = Par value × Coupon rate

K_P = Required rate of return on preferred stock or yield on preferred stock or cost preferred stock.

n = years to call

Call price = Par value + Call premium

Yield on Preference Shares (Kp)

The yield on irredeemable preferred stock can be calculated by using following equation.

$$Kp = \frac{D_P}{Vp}$$

Yield on redeemable preferred stock can be calculated by using the following equation.

$$\text{Approximate Kp} = \frac{D_P + \frac{MV - Vp}{n}}{\frac{MV + 2Vp}{3}}$$

Actual yield on preferred stock can be calculated by trial and error using the following equation:

$V_p = D_P \times PVIFA_{Kp, n} + MV \times PVIF_{Kp, n}$

V_P at Low Rate = Must be more than given price of preferred stock

V_P at High Rate = Must be less than given price of preferred stock

$$\text{Actual } K_P = LR + \frac{V_P \text{ at LR} - V_P}{V_P \text{ at LR} - V_P \text{ at HR}} \times (HR - LR)$$

Illustration 3

A share of preferred stock for Baseball Bat Company just sold for Rs. 90 and carries and Rs. 8 annual dividend. The par value of preferred stock is Rs.100.

a. What is the yield on this stock?

b. Now assume that this stock has a maturity period of five years. What is the preferred stock's yield to maturity?

Solution:

a.

Par value or Maturity value (MV) = Rs.100

Preferred stock dividend (D_p) = 8% of Rs 100 = Rs 8

Value of preferred stock (V_p) = Rs. 90

Yield on preferred stock (k_p) = ?

$$Kp = \frac{D_P}{Vp} = \frac{8}{90} = 0.0889 \text{ or } 8.89\%$$

b.

Years to maturity (n) = 5 years

Yield on preferred stock (k_p) = ?

$$\text{Approximate Kp} = \frac{D_P + \frac{MV - Vp}{n}}{\frac{MV + 2Vp}{3}} = \frac{8 + \frac{100 - 90}{5}}{\frac{100 + 2 \times 90}{3}} = \frac{10}{93.33} = 0.1072 \text{ or } 10.72\ \%$$

Try at 10%

$V_p = D_P \times PVIFA\ Kp, n + MV \times PVIF\ Kp, n$

$= 8 \times PVIFA_{10\%, 5} + 100 \times PVIF_{10\%, 5}$

$= 8 \times 3.7908 + 100 \times 0.6209 = Rs\ 92.42$

Try at 11%

$V_p = D_P \times PVIFA\ Kp, n + MV \times PVIF\ Kp, n$

$= 8 \times PVIFA_{11\%, 5} + 100 \times PVIF_{11\%, 5}$

$= 8 \times 3.6959 + 100 \times 0.5935 = Rs\ 88.93$

$$\text{Actual } K_P = LR + \frac{V_P \text{ at LR} - V_P}{V_P \text{ at LR} - V_P \text{ at HR}} \times (HR - LR)$$

$$= 10 + \frac{92.42 - 90}{92.42 - 88.93} \times (11 - 10) = 10.69\%$$

Common Stock Valuation

Common stock is a security that representing a share of ownership in a company. It represents the real ownership of the company. Company issues common stocks to raise permanent ownership capital. Common stocks/shares are also known as ordinary or equity shares. Common stockholders have various rights like preemptive right, voting right, right to get stock certificate, right for dividend, right to receive corporate reports,

right on assets, right to be elected in board of directors etc. Common stockholders have residual claim on income and assets. Common stockholders have right on a company's profits and assets after payment of bondholders' and preferred stockholders' claimed and their liability is limited to the amount of their investment in stocks.

The valuation of common stock is relatively more difficult because of two reasons. Firstly, the estimate of the amount and timing of cash flows are more uncertain. Secondly, the earnings and dividend on equity shares are generally expected to grow. The general valuation model of common stock can be written as follows:

$$P_0 = \frac{D_1}{(1 + Ke)^1} + \frac{D_2}{(1 + Ke)^2} + \ldots\ldots\ldots\ldots + \frac{D_n}{(1 + Ke)^n} + \frac{P_n}{(1 + Ke)^n}$$

Where,

P_0 = Current market price

D_n = Expected dividend per share at end of n year.

P_n = Price per share at end of n year.

Ke or Ks = required rate of return on common stock or cost of equity.

Different models for common stock valuation

Zero Growth Stock

The stock of the company which has constant earnings and divided forever is zero growth stock. Under this model, it is assumed that the corporation's stock price, earning per share and dividend per share remains constant. Furthermore, all earnings are distributed as dividend. So, there will be no growth or zero growth. The value of the zero growth stock can be calculated as follows: Mathematically:

$$\text{Intrinsic value of stock } (P_0) = \frac{D_0}{Ke}$$

Where,

D_0 = Dividend per share

Ke = Required rate of return on equity.

Illustration 3

ABC co. earns Rs. 2 per share and distributes all earnings as dividend. The investor's required rate of return on equity is 16%. Calculate the value of the stock:

Solution:

Earnings per share (EPS) = Rs. 2
Dividend per share (D_0) = Rs. 2
Required rate of return on equity (Ke) = 16%
Intrinsic value of stock (P_0)= ?
We know that,

$$\text{Intrinsic value of stock } (P_0) = \frac{D_0}{Ke} == \frac{2}{0.16} = \text{Rs. } 12.50$$

Hence, intrinsic value of stock is Rs. 12.50

Constant or Normal Growth Stock

This model has been developed by Gordon. So, this model is also known as Gordon's Model. Under this method, we assume that the price of stock, EPS and DPS grows at constant rate whether positively or negatively. There are some assumptions for the valuation of stock under this model:

i. The dividend will grow at a constant rate forever. It means the growth rate (g) remains the same forever whether positive or negative.
ii. Cost of equity (Ke) must always be greater than growth rate (g).

The intrinsic value (present value) of normal or constant growth stock can be calculated as follows:

$$\text{Intrinsic Value Stock } (P_0) = \frac{D_0(1+g)}{k_e - g} = \frac{D_1}{ke - g}$$

Similarly,

$$\text{Intrinsic Value Stock } (P_1) = \frac{D_1(1+g)}{k_e - g} = \frac{D_2}{ke - g}$$

$$\text{Intrinsic Value Stock } (P_2) = \frac{D_2(1+g)}{k_e - g} = \frac{D_3}{ke - g}$$

$$\text{Intrinsic Value Stock } (P_n) = = \frac{D_n(1+g)}{k_e - g} =$$

Where,
P_0 = intrinsic value or present value of common stock / Price of stock today
P_1 = Price of common stock at the end of year 1
P_2 = Price of common stock at the end of year 2
P_n = Price of common stock at the end of year n

D_0 = Last year' dividend
D_1 = expected dividend per share at the end of year 1.
D_2 = expected dividend per share at the end of year 2.
D_n= expected dividend per share at the end of year n.

k_s / K_e = required rate of return on common stock or cost of equity.
g= Constant growth rate

Calculation of expected dividend

$D_1 = D_0 (1+g)$
$D_2 = D_1 (1+g)$ or $D_0 (1+g)^2$
$D_n = D_0 (1+g)^n$

Price of stock is not dependent upon how long you plan to hold it. It means, the expected holding period does not affect the intrinsic value of stock today.

Calculation of growth rate

i. If retention ratio and ROE are given:

$g = b \times r$

Where,

b = retention ratio or 1 – Dividend payout ratio

r = return on equity

ii. If base year's and current year's DPS are given:

$$g = \left[\frac{\text{DPS current year}}{\text{DPS base year}}\right]^{1/n} - 1$$

iii. If base year's and current year's EPS are given:

$$g = \left[\frac{\text{EPS current year}}{\text{EPS base year}}\right]^{1/n} - 1$$

Illustration 4

XYZ Co. recently paid a cash dividend of Re. 10. It is expected to grow at a constant rate of 5% forever. The required rate of return on equity is 10%. Find:

a. Intrinsic value of stock today
b. What would happen to the value of stock, if the growth on stock were -5% in place of 5%?
c. Find the value of stock after 1 year.

Solution:

a.

Dividend per share (D_0) = Rs. 10
Required rate of return on equity (Ke) = 10%
Constant growth rate (g) = 5%
Intrinsic value of stock (P_0)= ?

$$P_0 = \frac{D_0(1+g)}{k_e - g} = \frac{10\ (1+0.05)}{0.10 - 0.05} = \text{Rs. } 210$$

Hence, the intrinsic value of stock today is Rs. 210

b.

If the growth rate (g) = -5%

Intrinsic value of stock (P_0)= ?

$$P_0 = \frac{D_0(1+g)}{k_e - g} = \frac{10\ (1 - 0.05)}{0.10 + 0.05} = \text{Rs. } 63.33$$

c.

$$\text{Value of stock after 1 year } (P_1) = \frac{D_0(1+g)^2}{k_e - g} = \frac{10\ (1 + 0.05)^2}{0.10 - 0.05} = \text{Rs. } 220.50$$

Hence, the value of stock after 1 year will be Rs. 220.50

Super Normal Growth Stock

The dividend and earnings of a company may not grow at a constant rate forever. The super normal stock is the stock whose earnings and dividend will grow by higher rate for a certain period and after which growth rate decline to the normal rate and remain constant indefinitely. The date from which the growth rate will be normal or constant is known as horizon date or terminal date. The value or price of stock on horizon date or terminal date is called terminal value or horizon value (P_n). The current market price of super normal growth rate can be calculated by using following steps:

Step 1: Find out expected dividend during the super normal growth rate period.

Step 2: Find out present value of expected dividend during super normal growth rate period.

$$\text{PV of dividend} = \frac{D_1}{(1+Ke)^1} + \frac{D_2}{(1+Ke)^2} + \ldots\ldots\ldots\ldots$$

Step 3: Calculate value of stock at the end of super normal growth period. (Terminal value and horizon value)

$$P_n = \frac{D_n\,(1+g_n)}{Ke - g_n}$$

Step 4: Calculate present value of terminal value

$$\text{PV of } P_n = \frac{P_n}{(1+Ke)^n}$$

Step 5: Calculate current market price (P_0)/ Intrinsic value

P_0 = PV of dividend + PV of P_n.

$$P_0 = \frac{D_1}{(1+Ke)^1} + \frac{D_2}{(1+Ke)^2} + \ldots\ldots\ldots\ldots + \frac{D_n}{(1+Ke)^n} + \frac{P_n}{(1+Ke)^n}$$

Illustration 5

Biki Co. recently paid a dividend of Rs. 2 and expected to grow at 25% in year 1, 20 % in year 2, 15% in year 3 and remain constant at a level of 6% forever. The investors required rate of return on equity is 14%.

Calculate:

a. Expected dividend for next 4 years

b. Horizon value, Terminal value

c. Price of stock today

Solution:

Last year's dividend (D_o) = Rs. 2

Growth rate in year 1 = 25%

Growth rate in year 2 = 20%

Growth rate in year 3 = 15%

Constant growth rate (g_n) = 6%

Required rate of return on equity (Ke) = 14%

a. Expected dividend for next 4 years:

$D_1 = D_0 (1+g) = 2 (1 + 0.25) = Rs. 2.50$

$D_2 = D_1 (1+g) = 2.50 (1 + 0.20) = Rs. 3$

$D_3 = D_2 (1+g) = 3 (1 + 0.15) = Rs. 3.45$

$D_4 = D_3 (1+g) = 3.45 (1 + 0.06) = Rs. 3.657$

b. Horizontal value or Terminal value (P_3)

$$P_3 = \frac{D_3 (1 + g_n)}{Ke - g_n} = \frac{3.657}{0.14 - 0.06} = Rs. 45.71$$

d. Price of stock today (P_0)

$$P_0 = \frac{D_1}{(1 + Ke)^1} + \frac{D_2}{(1 + Ke)^2} + \frac{D_3}{(1 + Ke)^3} + \frac{P_3}{(1 + Ke)^3}$$

$$= \frac{2.50}{(1 + 0.14)^1} + \frac{3}{(1 + 0.14)^2} + \frac{3.45}{(1 + 0.14)^3} + \frac{45.71}{(1 + 0.14)^3}$$

= 2.19 + 2.31 + 2.33 +30.85 = Rs. 37.68

Economic value added approach

Under this approach, value of the firm is first determined. Then, value of the debt and preferred stock is subtracted from the value of the firm to find out market value of equity. And at last, price per share is calculated by dividing value of equity by number of common shares.

Step 1 : Find out value of the firm.

$$\text{Value of the firm} = \frac{CF_1}{K - g} \quad \text{(When constant growth rate)}$$

$$\text{Value of the firm} = \frac{CF_1}{(1 + K)^1} + \frac{CF_2}{(1 + K)^2} + \ldots\ldots\ldots\ldots + \frac{CF_n}{(1 + K)^n} + \frac{TV_n}{(1 + K)^n}$$

Where,

CF = free cash flow

K = weighted average cost of capital

g = growth rate

TV = Terminal value

$$TV_n = \frac{CF_n (1 + g_n)}{k - g_n}$$

Step 2: Find out Market value of equity

Market value of equity = Value of firm – Value of preferred stock and debt.

Step 3: Find out price per share

$$\text{Price per share } (P_0) = \frac{\text{Market value of equity}}{\text{No. of common shares}}$$

Yield on Common Stock

The expected rate of return of a common stock is the sum of dividend yield and capital gain yield. The rate of return on a common stock is that rate which a stockholder expects to receive in the future.

Total Yield (K_e) = Dividend yield + Capital gain yield (g)

$$\text{Dividend yield} = \frac{D_1}{P_0}$$

$$\text{Capital gain yield} = \frac{P_1 - P_0}{P_0} \text{ Or Total yield – dividend yield}$$

Unit 4
Risk, Return and the Portfolio Theory

Concept of Return and Risk

Return and risk are the two important concepts in the context of financial management. They are perceived as fundamentals of finance theory. Therefore, understanding the nature of risk and return is the must to achieve the shareholders' wealth maximization objective of the firm. Risk in financial management refers to the uncertainty or variability of financial outcomes associated with an investment or financial decision. It represents the possibility that an investment may not achieve its expected or desired outcome. Investment is made with the objective of getting additional income in future. It takes place at present but returns are expected to generate in future. Thus, every investment involves some degree of risk. The return expected from any investment alternative is related with the degree of risk involved in that alternative. Investment alternative having higher degree of risk required higher expected return. Therefore, there exists direct and positive relationship between the risk and return.

Investments are made with the primary objective of getting return. Return is the motivating factor for the investment. It is reward for undertaking the risk in investment. Investment return is the additional income earned on from the investment. It can be measured in terms of increase in the wealth position of investor. If wealth received in future is greater than invested, then investor receives positive return – profit. But, if wealth received in future is lower than invested then investor has to bear negative return – loss. The return is the difference between the terminal wealth (what an investor received) and initial wealth (what an investor invest). The invested wealth of investor may be increase or decrease or remains the same in the future. If the terminal wealth is greater than the initial wealth there is positive return from the investment. If the terminal wealth is less than the initial wealth there is negative return from the investment. If the terminal wealth is equal with the initial wealth there is zero return. Investor always wants to higher return other things being the same.

Components of Return

There are two sources of income. The most common source is periodic payments, such as dividends or interest. The other source is the appreciation in value, or the capital gain (or capital loss).

Current income: Current income may take the form of dividends from stocks, interest received from bonds, or dividends received from mutual funds. It must be in the form of cash.

$$\text{Current yield} = \frac{\text{Current income}}{\text{Begining value}}$$

Capital gains (or losses): The second part of the return is the change in the market value of an investment. If market value of an investment at the end of period increases, there will be capital gain and if it decreases, there will be capital loss.

$$\text{Capital gain (or loss)} = \text{Ending value} - \text{Beginning value}$$

$$\text{Capital gain/loss yield} = \frac{\text{Ending value} - \text{Begining value}}{\text{Beginning value}}$$

Total Return: Total return is the total of current income and capital gain or loss from an investment. It is calculated as follows:

$$\text{Total rupee return} = \text{Current income} + \text{Capital gain}$$

Or,

$$\text{Total rupee return} = \text{Current income} - \text{Capital loss}$$

Or,

$$\text{Total rupee return} = \text{Current income} + \text{Ending value} - \text{Beginning value}$$

$$\text{Rate of return} = \frac{\text{Total rupee return}}{\text{Begining value}}$$

Or,

$$\text{Rate of Return} = \frac{\text{Ending value} - \text{Begining value} + \text{Current income}}{\text{Begining value}}$$

Or,

Rate of Return = Current yield + Capital gain yield

Symbolically,

$$\text{Rate of Return} = \frac{P_1 - P_0 + D_1}{P_0}$$

Where,

P_0 = Beginning value or beginning price

P_1 = Ending value or ending price

D_1 = Current cash income (Dividend)

Illustration 1

Suppose an investor purchased a share of common stock of XYZ Company at Rs 100 per share one year ago. The company declared and paid Rs 10 per share dividend during the year and investor sold the stock for Rs 110 per share after one year holding period.

Required:

a. Current income and current yield

b. Capital gain and capital gain yield

c. Total return in Rs. and rate of return

Solution,

a. Current income (D_1) =Rs. 10

$$\text{Current yield} = \frac{\text{Current income}}{\text{Begining value}} = \frac{\text{Rs 10}}{\text{Rs100}} = 0.10 \text{ or } 10\%$$

b. Capital gain = Ending value – Beginning value = Rs. 110 – 100 = Rs. 10

$$\text{Capital gain/loss yield} = \frac{\text{Ending value} - \text{Begining value}}{\text{Beginning value}} = \frac{\text{Rs 110} - \text{Rs 100}}{\text{Rs100}} = 0.10 \text{ or } 10\%$$

c. Total rupee return = Current income + Ending value – Beginning value

= Rs. 10 + Rs 110 – Rs 100 = Rs 20

$$\text{Rate of Return} = \frac{\text{Ending value} - \text{Begining value} + \text{Current income}}{\text{Begining value}}$$

$$= \frac{\text{Rs 110} - \text{Rs 100} + \text{Rs 10}}{\text{Rs 100}} = 0.20 \text{ or } 20\%$$

Measurement of Rate of Return

Holding Period Return

The return to a saver is the amount of current income (interest) earned on a given deposit. However, the amount invested in a savings account is not subject to change in value, as it is for investments such as stocks, bonds, mutual funds, and real estate. Because we are concerned with a broad range of investment alternatives, most of which have some degree of marketability, we need a measure of return that captures both periodic benefits and changes in value. One such measure is holding period return. The holding period is the period of time over which one wishes to measure the return on an investment alternative and the return for that period is the holding-period return (HPR). The holding period return (HPR) is the total return (TR**)** earned from the holding an investment for a specified period of time (the holding period). It represents the sum of current income and capital gains (or losses) achieved over the holding period, divided by the beginning investment value. The holding period return is easy to use in making investment decisions. It considers both current income and capital gains relative to the beginning investment value. The alternative having higher HPR is accepted for investment. The equation for calculating holding period return (HPR) is:

$$\textbf{HPR} = \frac{\text{Ending value} - \text{Begining value} + \text{Current income}}{\text{Begining value}}$$

Symbolically,

$$\textbf{HPR} = \frac{P_1 - P_0 + D_1}{P_0}$$

Where,

HPR = Holding period return
P_1 = The ending price
P_0 = The beginning price
D_1 = Current cash income (Dividend)

Illustration 2

Suppose, an investor purchased stocks of Fancy Company at Rs 500 per share one year ago. The company declared and paid Rs 20 per share dividend during the year and investor sold the stocks for Rs 580 per share after one year holding period. Find holding period return.

Solution:

Purchase price per share (P_0) = Rs. 500
Selling price per share (P_1) = Rs. 580
Dividend per share (D_1) = Rs. 20

$$\text{Holding period return (HPR)} = \frac{P_1 - P_0 + D_1}{P_0} = \frac{580 - 500 + 20}{500} = 20\%$$

Average Rate of Return

Investors may hold their investment alternative for a number of periods and interested to know the average realized rate of return earned by them from the holding of their investment alternatives. The average rate of return is calculated dividing the sum of the returns over the investment horizon by the number of investment period. The alternative having higher average rate of return is accepted for investment. The following equation is used to calculate the average return:

$$\text{Average rate of return } (\bar{R}) \text{ or } E(R) = \frac{\Sigma R}{n}$$

Where,

ΣR = Total rate of return or sum of returns.

n = No. of observations

Illustration 3

Consider the rate of return on Stock A during the last five years period:

Year	2018	2019	2020	2021	2022
Return %	15	18	20	22	25

Required: Average rate of return.

Solution:

$$\text{Average rate of return } (\bar{R}) = \frac{\Sigma R}{n} = \frac{15\% + 18\% + 20\% + 22\% + 25\%}{5} = 20\%$$

Hence, the average rate of return is 20%.

Expected Rate of Return

The expected rate of return from a probability distribution, often referred to as the "expected value" or "mean return," is a statistical measure that represents the average or anticipated return an investment or financial asset is expected to generate over a given period. It is calculated by weighting each possible return by its associated probability and summing them together. This calculation provides a way to assess the central tendency of potential returns, taking into account the likelihood of each outcome. To compute the expected rate of return, you need to have a probability distribution that describes the likelihood of different returns. For example, in the context of an investment, you might have market analysis that indicates the probabilities of various returns. By using this data, you can estimate the expected rate of return for that investment. The expected rate of return is a valuable tool for investors and financial analysts, as it provides a quantitative measure of what can be anticipated from an investment in terms of average performance. The formula for calculating the expected rate of return is as follows:

$$E(R) \text{ or } \bar{R} = P_1R_1 + P_2R_2 + \ldots\ldots + P_nR_n$$

Or,

$$\Sigma(P_i \times R_i)$$

Where,

E(R) = Expected rate of return

R_i = Each possible return

P_i = Probability of obtaining return R_i

Illustration 4

Consider the following rate of return and probability distribution based on the different state of economy.

State of economy	Probability (P)	Return (R)
Recession	0.30	-10%
Moderate	0.40	15%
Boom	0.30	20%

Required: Expected rate of return.

Solution,

Expected rate of return $E(R) = \Sigma(P_i \times R_i)$

$= 0.30 \times (-10) + 0.40 \times 15 + 0.3 \times 20 = 9\ \%$

Hence, the expected rate of return is 9 %.

Measurement of Risk

In financial management, risk refers to the uncertainty and potential variability of financial outcomes associated with an investment. It is a fundamental concept that encompasses the possibility of adverse or unexpected events affecting the financial well-being of an organization or individual. Assessment and measurement of risk in financing decision is crucial aspect of financial management. Risk implies that financial outcomes may vary from the expected or desired results. It arises from the uncertainty of financial outcomes.

In the context of investment, risk is defined as the chance that the actual return can be different than expected rate of return. In another word, risk is the variability in the return from investment. The greater the variability of the returns, the riskier the investment is and vice versa. The various factors such as market conditions, economic fluctuations, changes in interest rates, industry-specific issues, or unexpected events like natural disasters or regulatory changes may play role to make the actual return different from the expected return. The investment alternatives are different in terms of

risk. They range from riskless alternatives to most risky alternative. When we are sure that the actual return will be equal to the expected return, we say there is no risk at all. There are several tools to measure the risk in total and well as per unit like variance, standard deviation, coefficient of variations etc.

Standard deviation

Standard deviation is the most common statistical indicator of an asset's risk. It is the best measure of dispersion as it satisfies most of the requisites of good measure of dispersion. It measures the dispersion around the expected value. It is simply the square root of variance. Because standard deviation measures variation, which is associated with risk, we generally say that an investment with a lower standard deviation is considered less risky than an investment with a higher standard deviation; all else equal, if two investments have the same return but different standard deviations, a rational investor would prefer the investment with the lower standard deviation—that is, lower risk is preferred to higher risk; all else equal, if two investments have the same standard deviation but different expected returns, a rational investor would prefer the investment with the higher expected return—that is, higher returns are preferred to lower returns.

The most common statistical indicator of an asset's risk is the standard deviation. Standard deviation measures the total risk of an investment. It is a statistical measure of the variability of a distribution of return around its mean. It gives an idea of how far above or below the expected value and the actual value is likely to be. In other words, it measures the standard average dispersion around the mean. High standard deviation indicates high risk and vice-versa. Standard deviation can be calculated from the historical returns of an asset and using probability distribution of returns of the asset.

When historical returns are given:

$$\text{Standard Deviation } (\sigma) = \sqrt{\frac{\Sigma(R-\bar{R})^2}{n-1}}$$

When probability distribution of returns are given:

$$\text{Standard deviation } (\sigma) = \sqrt{\Sigma(R - E(R))^2 \times P}$$

Variance

As the statistical measure of the dispersion, the variance measures how widely the returns are dispersed around the average return or expected return of the asset. The higher the **variance** of returns, the higher is the assets or investments total risk. It is denoted by σ^2, pronounced as sigma square. High variance indicates high risk and vice-versa. The variance of an asset's return can also be calculated from the historical return and using the probability distribution of return.

When historical returns are given:

Variance of returns (σ^2) $= \frac{\Sigma(R-\bar{R})^2}{n-1}$

When probability distribution of returns are given:

Variance of returns (σ^2) $= \Sigma(R - E(R))^2 \times P$

Coefficient of Variation (C.V.)

It is the most useful and worldwide famous tool to measure the risk in per unit basis. It measures the risk in per unit basis which mean what amount of risk must be taken for every % of return. The coefficient of variation shows the risk per unit of return and it provides a more meaningful basis for comparison when the expected returns on two alternatives are not the same. The coefficient of variation is calculated dividing the standard deviation by the expected return of an asset.

$$C.V. = \frac{\sigma}{\bar{R}} \text{ Or } \frac{\sigma}{E(R)}$$

Illustration 5

Consider the following historical data for stock A.

Year	R_A
2007	10%
2008	12%
2009	14%
2010	16%

Required:

a. Expected return for stock A.
b. Standard deviation and variance for stock A's return.
c. Coefficient of variance.

Solution:

Calculation

Year	**R_A**	**$(R_A - \bar{R}_A)^2$**
2007	10%	$(10-13)^2 = 9$
2008	12%	$(12-13)^2 = 1$
2009	14%	$(14-13)^2 = 1$
2010	16%	$(16-13)^2 = 9$
	52	$\Sigma(R_A - \bar{R}_A)^2 = 20$

a. Expected rate of return ($\bar{R}$) or E(R) $= \frac{\Sigma R}{n} = \frac{52}{4} = 13\%$

b. Standard deviation of returns for Stock 'A' (σ_A) = $\sqrt{\frac{\Sigma(R_A - \bar{R}_A)^2}{n-1}}$

$= \sqrt{\frac{20}{4-1}} = 2.582\ \%$

Variance of returns for stock 'A' (σ_A^2) $= (\sigma A)^2 = (2.582)^2 = 6.6667$

c. Coefficient of variation (CV_A) = $\frac{\sigma_A}{\bar{R}_A} = \frac{2.582}{13} = 0.1986$

Illustration 6

Consider the following probability distribution of alternative rate of return associated with stock A given in the following table.

State of economy	Probability	Stock A
Recession	0.3	5%
Average	0.4	10
Boom	0.3	15

Required:

a. Expected return

b. Standard deviation

c. Variance

d. Coefficient of variation

Solution:

Calculation

Probability(P)	R_A	$P \times R_A$	$R_A - E(R_A)$	$[R_A - E(R_A)]^2 P$
0.30	5%	1.5%	-5	7.50%
0.40	10	4	0	0
0.30	15	4.5	5	7.5
		10		15

a. Expected return of Stock A, $E(R_A) = \Sigma(P \times R_A) = 10\%$

b. Standard deviation of returns on Stock A (σ_A) = $\sqrt{P[R_A - E(R_A)]^2} = \sqrt{15} = 3.87\%$

c. Variance of returns on Stock A (σ^2_A) = $[R_A - E(R_A)]^2 P = 15\%$

d. Coefficient of variation (C.V.) = $\frac{\sigma}{E(R)} = \frac{3.87}{10} = 0.387$

Portfolio Risk and Return

Most investors are risk averter. Therefore, they tend to invest in a group of assets rather than a single asset. When funds are invested in more than one asset, the group of assets held together is known as a portfolio. The main objective of portfolio is to reduce the risk as far as possible by making investment in many assets rather than investing in a single one. It is the diversification of investment to minimize the risk as well as maximize the return. If fund is invested in several assets, the loss in one will be compensated by the gain from others. Investors can construct a number of portfolios from the given set of assets. A rational investor attempts to find the most efficient from these portfolios. The efficiency of portfolio can be evaluated in terms of the expected return and risk of portfolio.

Portfolio return is the expected return while investing more than in one asset. The expected return of the portfolio may be defined as the weighted average of the expected return of the individual assets included in the portfolio. The weights reflects the proportion of the total investable fund invested in each assets included in the portfolio. It is the weighted average rate of return from total assets portfolio. Based on the weights and the expected return of each asset, the expected return of the portfolio is calculated as follows:

$E(R_P)$ or $\overline{R}_P = W_1\overline{R}_1 + W_2\overline{R}_2 + \ldots + W_n\overline{R}_n$

Where,

$W_1, W_2 \ldots W_n$ = proportion of assets among the total investment.

$\overline{R}_1, \overline{R}_2, \overline{R}_n$ = Expected rate of return of every individual assets

Illustration 7

You own a portfolio that has Rs. 12,000 invested in Stock M and Rs. 18,000 in stock N. If the expected returns on these stocks are 11 percent and 18 percent respectively, what is the expected return on the portfolio?

Solution:

Total investment = Rs. 12,000 + 18,000 = Rs. 30,000

$W_M = \frac{12000}{30000} = 0.4$ and $W_N = \frac{18000}{30000} = 0.6$

Expected return on Stock M, $\overline{R}_M = 11\%$

Expected return on stock N, $\overline{R}_N = 18\%$

Expected return on Portfolio, $\overline{R}_P = ?$

We have,

$\overline{R}_P = W_M \times \overline{R}_M + W_N \times \overline{R}_N$

$= 0.4 \times 11\% + 0.6 \times 18\%$

$= 15.2\ \%$

Portfolio risk refers to the risk which is created while investing in more than single asset. It is the variability of the expected return of portfolio. Like the risk of an individual asset is measured by the standard deviation or variance of its return, the risk of a portfolio is also

measured by the variance and standard deviation of its return. The risk of the portfolio is not the simple weighted average of the risk of the individual assets. It does not depend only in the risk of the assets included in the portfolio but also on the relationship of returns of those assets. The risk of the portfolio is influenced by three elements:

- Proportion of fund invested in each individual assets included in the portfolio.
- Risk of the individuals assets included in the portfolio and
- Co-variance or correlation coefficient between the returns of assets included in the portfolio.

When covariance is given:

Variance of returns of Portfolio (σ_P^2) $= W_A^2\sigma_A^2 + W_B^2\sigma_B^2 + 2\,COV_{AB}.W_A.W_B$

Standard deviation of Portfolio return (σ_P) $= \sqrt{W_A^2\sigma_A^2 + W_B^2\sigma_B^2 + 2\,COV_{AB}.W_A.W_B}$

When correlation coefficient is given:

Variance of returns of Portfolio (σ_P^2) $= W_A^2\sigma_A^2 + W_B^2\sigma_B^2 + 2\,r_{AB}.\sigma_A.\sigma_B.W_A.W_B$

Standard deviation of Portfolio return (σ_P) $= \sqrt{W_A^2\sigma_A^2 + W_B^2\sigma_B^2 + 2\,r_{AB}.\sigma_A.\sigma_B.W_A.W_B}$

COVARIANCE

Covariance is a statistical measure of the relationship between two random variables. It is a measure of how to random variables move together. The covariance between the returns of two securities may be positive, negative or zero. A positive covariance indicates that the rate of return on the two securities tend to move in the same direction. A negative covariance indicates that the rate of return of two securities tend to move in the opposite direction. A covariance of zero indicates that there is no relation between the rates of return of two securities. The covariance between the returns of two assets can be calculated using their historical returns and the probability distribution of returns. Using historical returns, the covariance between the returns of two assets is calculated using following equation

$$\text{Covariance } (COV_{AB}) = \frac{\Sigma(R_A - \bar{R}_A)(R_B - \bar{R}_B)}{n-1}$$

The covariance between the return of two assets can also be calculated using their joint probability distribution of return as follows:

$$\text{Covariance } (COV_{AB}) = \Sigma(R_A - \bar{R}_A)(R_B - \bar{R}_B) \times P$$

Correlation Coefficient

The degree of relationship between the two variables is also measured by correlation coefficient. While, covariance is an absolute measure, the correlation coefficient is the relative measure of association. The formal relationship between covariance and correlation coefficient is given by the following equation.

$COV_{AB} = r_{AB}\sigma_A\sigma_B$

Correlation coefficient AB (r_{AB}) $= \frac{Cov_{AB}}{\sigma_A\sigma_B}$

The above relationship shows that when covariance is positive, correlation coefficient is also positive. If the covariance between the returns of two assets is negative, the correlation coefficient is also negative. If the covariance is zero, the correlation coefficient is also zero. The value of correlation coefficient ranges between +1 and –1. A correlation coefficient of +1 is called perfectly positive correlation which means returns of two assets always move together in the same direction. A correlation coefficient of –1 is called perfectly negative correlation, which means returns of two assets always move in the completely opposite direction. A correlation coefficient of zero means that there is no relationship between the two asset's returns.

Effect of Correlation on Portfolio Risk

If the weights of the stocks assumed stock A and stock B are equal.

- When returns on two stock is perfect negatively correlated (r_{AB} = –1), the standard deviation of portfolio is zero which means complete riskless.
- When return on stocks are perfect positively correlated (r_{AB} = +1), the standard deviation of the portfolio is the simple weighted average of the standard deviation of the individual assets.
- When return on stocks are positively correlated, not perfectively. The risk on portfolio is reduced but not eliminated completely.

Illustration 8

Consider the following probability distribution of alternative rate of return associated with stock A and Stock B given in the following table.

State of economy	Probability	Stock A	Stock B
Recession	0.3	5%	30%
Average	0.4	10	25
Boom	0.3	15	10

Required:

a. Calculate the expected return and standard deviation of stock A and stock B.

b. What are the covariance and correlation coefficient between stock A and Stock B?

c. If you form a portfolio of stock A and stock B comprising 70 percent wealth in stock A and the rest in stock B. calculate the risk (standard deviation) and return of your portfolio.

Solution:

a. Calculation of expected return and standard deviation of stock A and B:

Expected return and standard deviation of stock A

Probability(P)	R_A	$P \times R_A$	$R_A - E(R_A)$	$P[R_A - E(R_A)]^2$
0.30	5%	1.5%	-5	7.50%
0.40	10	4	0	0
0.30	15	4.5	5	7.5
		10		15

Thus,

Expected return of Stock A, E (R_A) =$\Sigma(P \times R_A)$ = 10%

Standard deviation of Stock A (σ_A) = $\sqrt{P[R_A - E(R_A)]^2}$ = $\sqrt{15}$ = 3.87%

Expected return and standard deviation of stock B

Probability(P)	R_B	$P \times R_B$	$[R_B - E(R_B)]$	$P[R_B - E(R_B)]^2$
0.30	30%	9%	8%	19.2
0.40	25	10	3	3.6
0.30	10	3	-12	43.2
		22%		66

Expected return of Stock B, E (R_B) = $\Sigma(P \times R_B)$ = 22%

Standard deviation of Stock B, (σ_B) = $\sqrt{P[R_B - E(R_B)]^2}$ = $\sqrt{66}$ = 8.12%

b.

Covariance of return between Stock A and B

Prob.(P)	$[R_A - E(R_A)]$	$[R_B - E(R_B)]$	$[R_A - E(R_A)][R_B - E(R_B)]P$
0.30	-5%	8%	-12
0.40	0	3	0
0.30	5	-12	-18
		COV_{AB} = -30	

$COV_{AB} = \sum[R_A - E(R_A)][R_B - E(R_B)]P$ = -30

The correlation between stock A and B, $r_{AB} = \frac{Cov_{AB}}{\sigma_A \sigma_B} = \frac{-30}{3.87 \times 8.12}$ = -0.9547

c. Proportion of Stock A (W_A) =0.70

Proportion of Stock B (W_B) = 0.30

Portfolio return $[E(R_P)] = W_A \times E(R_A) + W_B \times E(R_B)$

$= 0.7 \times 10\% + 0.3 \times 22\%$

$= 7\% + 6.6\% = 13.6\%$

Portfolio risk (σ_P) = $\sqrt{(w_A)^2(\sigma_A)^2 + (w_B)^2(\sigma_B)^2 + 2w_A w_B Cov_{AB}}$

$= \sqrt{(0.7)^2 \times (15) + (0.3)^2 \times (66) + 2(0.7)(0.3)(-30)}$

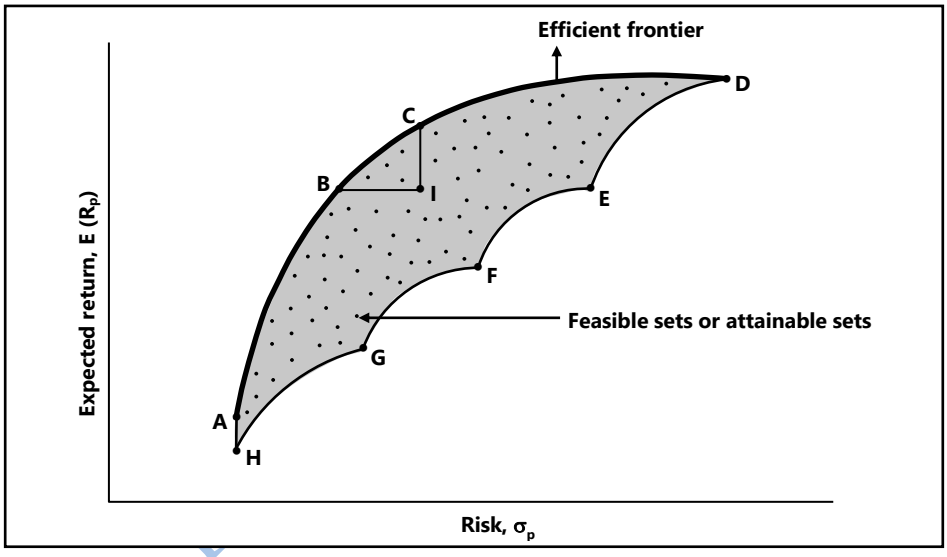
$= \sqrt{7.35 + 5.94 - 12.6}$ = 0.83%

Efficient Portfolio

Portfolio opportunity set or investment opportunity set shows the risk and returns of all possible portfolios which can be made from a set of available securities. In case of N securities we can have an infinite number of possible portfolios in which an investor can invest. The investor can choose any portfolio from the opportunity set. For example in case of two securities A and B, we can combine these two securities in a number of portfolios by just changing their weights or proportion of funds invested in each. We can have 1% in A and 99% in B, 2% in A and 98% in B and so on. The number of such portfolios will be many. Every portfolio is then analyzed in terms of its risk and return. The graphical presentation of these portfolios is termed as Portfolio or Investment Opportunity Set.

The efficient frontier is a concept used in finance and investment theory that represents a set of optimal portfolios that offer the highest expected return for a given level of risk, or the lowest level of risk for a given expected return. The efficient frontier is constructed by plotting various combinations of assets or investments on a graph, where the x-axis represents the level of risk (usually measured by standard deviation) and the y-axis represents the expected return. Each point on the graph represents a portfolio

with a different allocation of assets, and the efficient frontier is the curve that connects the portfolios with the highest expected return for each level of risk. This set of efficient portfolios is popularly known as Efficient Frontier. Thus, efficient frontier is the graphical presentation of all efficient portfolios out of the feasible portfolios. It must be noted that all efficient portfolios are feasible but all feasible portfolios are not efficient. Investors can use the efficient frontier to determine the optimal portfolio allocation that maximizes expected return for a given level of risk tolerance or minimizes risk for a given level of expected return. By selecting a portfolio that lies on the efficient frontier, investors can achieve the highest possible return for a given level of risk, or the lowest possible risk for a given level of return. The efficient frontier consists of the set of all efficient portfolios that yield the highest possible return for each level of risk. Effective portfolios are those which provide higher return for given level of risk or bear minimum risk for given level of return. The efficient set together with the portfolio opportunities set has been presented in following figure:



Minimum Variance Portfolio / Minimum Risky Portfolio

Minimizing the risk is the main objectives of the portfolio. Normally investors want to minimize the risk because investors are assumed to be risk averse. So, they prefer minimum risky portfolio among the efficient frontier. Minimum variance portfolio refers to the combination of the assets at which risk of the portfolio is minimized. In other words, that proportion of the assets at which variance or standard deviation of the portfolio is minimum. It is interesting to note here that minimum variance portfolio is also the optimal portfolio for an investor who wants to minimize exposure to risk. To find out the proportion of assets on minimum variance portfolio, on two assets case, we use the following equation.

$$\text{Optimal Weight of Stock A } (W_A) = \frac{\sigma_B^2 - COV_{AB}}{\sigma_A^2 + \sigma_B^2 - 2\,COV_{AB}} = \frac{\sigma_B^2 - r_{AB}\,\sigma_A\,\sigma_B}{\sigma_A^2 + \sigma_B^2 - 2\,r_{AB}\,\sigma_A\,\sigma_B}$$

Optimal Weight of Stock B (W_B) = 1 – W_A Or,

$$W_B = \frac{\sigma_A^2 - COV_{AB}}{\sigma_A^2 + \sigma_B^2 - 2\,COV_{AB}} = \frac{\sigma_A^2 - r_{AB}\,\sigma_A\,\sigma_B}{\sigma_A^2 + \sigma_B^2 - 2\,r_{AB}\,\sigma_A\,\sigma_B}$$

If r_{AB}= -1, then the following formula is used to calculate optimal weight

$$\text{Optimal Weight of Stock A } (W_A) = \frac{\sigma_B}{\sigma_A + \sigma_B}$$

$$\text{Optimal Weight of Stock B } (W_B) = 1 - W_A \text{ Or, } W_B = \frac{\sigma_A}{\sigma_A + \sigma_B}$$

Illustration 9

Consider the following data about two stocks A and B included in a portfolio.

Stock	Expected return	Standard deviation
A	15%	10%
B	25%	20%
Correlation coefficient between returns (r_{AB}) = 0.40		

a. Compute expected return and the standard deviation of an equally-weighted portfolio?

b. If you create the lowest-risky portfolio, what should be the risk and return of that portfolio?

Solution:

a. If A and B are combined with equal weight

Wight of Stock A (W_A) = 0.5

Wight of Stock B (W_B) = 0.5

Expected return on Stock A, E (R_A) = 15%

Expected return on Stock B, E (R_B) = 25%

Standard deviation of Stock A's return (σ_A) = 10%

Standard deviation of Stock B's return (σ_B) = 20%

Correlation between Stock A and Stock B (r_{AB}) = 0.4

Covariance between Stock A and Stock B (COV_{AB}) = $r_{AB}.\sigma_A\sigma_B$ = 0.4 × 10 × 20 = 80

Expected return on portfolio, E (Rp) = $W_A \times E(R_A) + W_B \times E(R_B)$

= 0.5 × 15 + 0.5 × 25 = 20%

Standard deviation of Portfolio return (σ_P) = $\sqrt{W_A^2\sigma_A^2 + W_B^2\sigma_B^2 + 2\,COV_{AB}.W_A.W_B}$

$= \sqrt{0.5^2.10^2 + 0.5^2.20^2 + 2.80.0.5.0.5}$

= 12.85%

b. Minimum risky portfolio

$$\text{Optimal Weight of Stock A } (W_A) = \frac{\sigma_B^2 - COV_{AB}}{\sigma_A^2 + \sigma_B^2 - 2\,COV_{AB}} = \frac{20^2 - 80}{10^2 + 20^2 - 2\,.\,80} = 0.94$$

Optimal Weight of Stock B (W_B) = 1 – W_A = 1 – 0.94 =0.06

Expected return on portfolio, E(Rp) = $W_A \times E(R_A) + W_B \times E(R_B)$

= 0.94 × 15 + 0.06 × 25 = 15.6%

$\sigma_P = \sqrt{W_A^2\sigma_A^2 + W_B^2\sigma_B^2 + 2\,COV_{AB}.W_A.W_B}$

$= \sqrt{0.94^2.10^2 + 0.06^2.20^2 + 2.80.0.94.0.06}$

=9.94%

Risk Diversification

Portfolio is constructed to reduce the level of risk or to diversify the level of risk. Diversification can reduce the certain level of risk but all risk cannot be diversified away. If the returns of the securities that are included in portfolio which do not exactly vary in the same direction, then diversification can reduce risk. Risk has two parts: systematic risk and unsystematic risk.

Total risk = Systematic risk + Unsystematic risk

Systematic Risk: Systematic risk is that part of total risk which is caused by factors beyond the control of a specific company or individual. Systematic risk is caused by factors such as economic, political, socio, cultural etc. As market forces are the sources of systematic risk, it is also known as market risk. All the investments or securities are subject to systematic risk and therefore it is non-diversifiable risk. Systematic risk cannot be diversified away by holding a large number of securities. This risk cannot be diversified away even by holding an efficient portfolio of assets. . Interest rate risk due to fluctuations in interest rates, purchasing power due to inflation risk, trade cycles or business conditions or monsoon rains are the common sources of systematic risk.

Unsystematic Risk: A part of the risk arises from the uncertainties which are unique to individual securities and which is diversifiable if large number of securities are combined to form well diversified portfolios. The unique risk of individual securities in a portfolio cancels out each other. This part of the risk can be totally reduced through diversification and is called unsystematic or unique risk. Unsystematic risk is the risk caused by factors within the control of a specific company such as issues related to management, assets, labour or capital. Unsystematic risk refers to that portion of the total variability of the return caused due to unique factors, which relating to that firms or industry in terms of management failure, labor strikes, raw material scarcity etc. Specifically, diversifiable risk (unsystematic risk) affects specific companies, such as bad management, lawsuits, and labor trouble. Diversifiable risk can be lowered by investing in different companies in different sectors or by investing in different asset classes, but can be minimized by investing in assets that have a negative correlation coefficient, where the loss of some assets are offset by the gain of other assets.

Beta Coefficient (An Indicator of Systematic Risk)

Systematic risk affects all investment returns but some assets are more sensitive to systematic risk than others, even those in the same asset class, such as the stocks of different companies. It is the relative measure or indicator of systematic risk which indicate the level of systematic risk of particular investment based on the market variance. Investors are demanding higher level for the systematic risk. If a particular stock, for instance, has greater volatility due to systematic risk than the general market, then it would be prudent for an investor to demand a greater return from that stock than the market return, which is the return of the market as a whole, such as the stock market, or a subclass of a market, such as the NASDAQ or the S&P 500 stock index in USA and NEPSE in Nepal. The beta of an asset, such as a stock, measures the market risk of that

particular asset as compared to the rest of the market — hence, it also measures volatility of the asset compared to the general market. The beta is calculated as under:

$$\beta_j = \frac{COV_{jm}}{\delta_M^2} = \frac{r_{jm} \times \delta_j}{\delta_M}$$

A high beta indicates a high level of risk and a low beta represents a low level of risks. Stocks with betas greater than 1 are more volatile than the market index and are known as aggressive stocks. In contrast, stocks with beta less than 1 are less volatile than the market index and are known as defensive stocks. A stock with a beta of greater than 1 is riskier than the general market, but potentially more profitable; a beta of less than 1 is generally less risky than the general market.

Since market is average of all listed securities, is assumed as the well-diversified portfolio in itself and there is no unsystematic risk. In other words, 100 percent risk of market is defined as systematic risk. So, the beta of the stock index market is considered to be 1.

Illustration 11

Consider the following co-variances of assets with market return and variance of market is 144.

Stocks	Co-variance with market
A	180
B	144
C	108

From above data, calculate beta of each stock and explain their nature.

Solution

$$\beta_A = \frac{COV_{AM}}{\delta_M^2} = \frac{180}{144} = 1.25$$

$$\beta_B = \frac{COV_{BM}}{\delta_M^2} = \frac{144}{144} = 1$$

$$\beta_C = \frac{COV_{CM}}{\delta_M^2} = \frac{108}{144} = 075$$

Stock A is aggressive stock because its beta is greater than one. Stock C is defensive stock as its beta is less than one. Stock B is normal stock as its beta is equal to one.

Portfolio Beta

Beta coefficient of a portfolio is a weighted average of the individual securities' betas. The method of calculating beta coefficient can also be applied to a portfolio. Portfolio beta coefficient shows how volatile the portfolio is in relation to the market. A portfolio consisting of low-beta securities will itself have a low beta and vice versa. The main objective of a portfolio is to reduce diversifiable risk. By selecting the right assets in the right proportions, it may be possible to reduce diversifiable risk to near zero, but the portfolio would still have systematic risk, which also affects the general market. Portfolios, like stocks, have betas which measure the systematic

risk of the portfolio compared to that of the market. The portfolio beta is equal to the sum of the beta of the weighted average of each security's value over the value of the portfolio.

$$\beta_P = W_1 \times \beta_1 + W_2 \times \beta_2 + \ldots\ldots + W_n \times \beta_n$$

$$\beta_P = \frac{COV_{PM}}{\delta_M^2}$$

Where,

β_p = Beta of a portfolio

$W_1 \ldots\ldots W_n$ = Proportions of fund invested in each individual security included in the portfolio.

$\beta_1 \ldots \beta_n$ = Beta of individual securities included in the portfolio.

Illustration 12

Consider the following stock, their investment and systematic risk indicate beta coefficient.

Stock	Investment	Beta
A	20,000	1.5
B	50,000	1
C	30,000	0.8

Calculate portfolio beta coefficient.

Solution:

Weight of Stock A, $W_A = \frac{20000}{100000} = 0.20$

Weight of Stock B, $W_B = \frac{50000}{100000} = 0.50$

Weight of Stock C, $W_A = \frac{30000}{100000} = 0.30$

Portfolio Beta (β_P) $= W_A\beta_A + W_B\beta_B + W_C\beta_C$

$= 0.20 \times 1.5 + 0.50 \times 1 + 0.30 \times 0.8$

$= 0.30 + 0.50 + 0.24 = 1.04$

Capital Asset Pricing Model (CAPM)

Required rate of return refers to the minimum rate of return that the investor wants to earn from a particular investment. Primarily, it depends on the risk of investment alternative. Expected return on a security can also be calculated using Capital asset pricing model. CAPM describes the relationship between risk and expected return that is used in the pricing of risky securities. The CAPM specifies the relationship between risk and required rate of return of an asset. It is based on the proposition that any asset's required rate of return is equal to the risk free rate of return plus risk premium. As per model, the risk premium is provided only for bearing systemic risk as unsystematic risk can be diversified away through diversification.

Capital asset pricing model shows how risky assets are priced in efficient capital market. CAPM helps in the prediction of expected return on a security or portfolio. The expected return determined through CAPM can then be used to find out whether a security is earning more or less than the expected return. From investment point of view an investor should select securities

which provide higher return than the one expected by CAPM. Followings are the assumptions of Capital Asset Pricing Model:

- Investors are risk averse. They choose the portfolio with higher expected return and lower standard deviation.
- All assets can be freely traded.
- Investors evaluate portfolio by considering expected return and standard deviation over a single period horizon.
- There are no taxes or transaction costs.
- Investors can lend and borrow at risk free rate..
- Capital markets are efficient.
- The market portfolio is exits and is measurable.

The Capital Asset Pricing Model is given in equation:

$$E(Rj) = R_F + (R_M - R_F)\beta j$$

Where,

E(Rj) = Expected return on a security j

R_F = Risk free return

R_M= Expected market return

βj =Beta of the security

The CAPM can be divided into two parts (1) risk-free interest R_F which is required return on a risk free asset typically Treasury bill or short-term government security and (2) the risk premium. The (R_M – R_F) portion of the risk premium is called the market risk premium, because it represents the premium. Investors compare the expected rate of return and required rate of return for investment decision. They invest in investment alternative only when the expected rate of return is higher or at least equal to the required rate of return of particular investment. The following table provides an overview about the investment decision based on the comparison between expected return and required rate of return.

S.N.	Possible Condition	Over / under priced	Decision
1	Expected rate of return > Required rate of return	Under-priced	Buy
2	Expected rate of return < Required rate of return	Over-priced	Sell
3	Expected rate of return = Required rate of return	Fairly priced	Indifferent

Security Market Line

When the relative risk premium, represented by beta, is plotted in a graph against the required return, it yields a straight line known as the security market line (SML). This line begins at the risk-free rate and rises with beta.

The SML describes the relationship between an asset's systematic risk and expected return. In other words, the depiction of the capital asset pricing model (CAPM) as a graph that reflects the

required return in the marketplace for each level of non-diversifiable risk (beta). The SML will, in fact, be a straight line. It reflects the required return in the marketplace for each level of non-diversifiable risk (beta). In the graph, risk as measured by beta, β_j, is plotted on the x axis, and required returns, R_J, are plotted on the y axis. The risk-return trade- off is clearly represented by the SML. It displays the expected rate of return of an individual security as a function of systematic, non-diversifiable risk (its beta). The SML is a liner relationship between required rate of return and systematic risk. The SML equation that is used to find the required rate of return is as:

$E(Rj) = R_F + (R_M - R_F)\ \beta_j$

Slope of SML or market risk premium= $R_M - R_F$

The graphic view of SML has been presented in following figure:

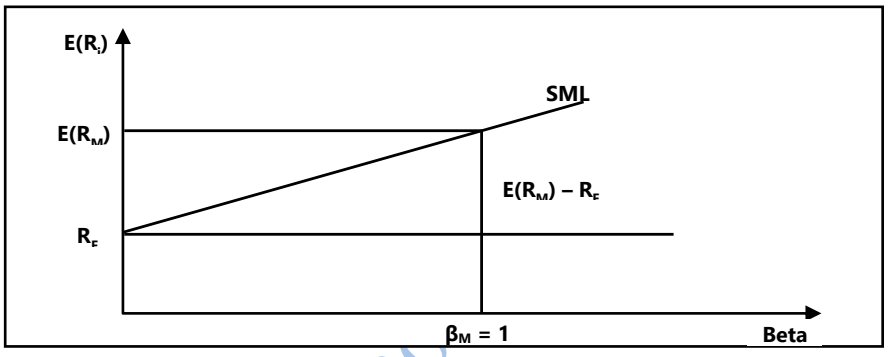


Illustration 13

Suppose risk free rate is 5 percent, expected return in market is 10 percent. The required rate of return of stock A is 15 percent.

a. Calculate stock A's beta.
b. If stock A's beta were 1.5, what would be stock A's new required of return?

Solution

Given,

Risk free rate (R_F) = 5%

Expected return on market $E(R_M)$ = 10%

Required rate of return of stock A, $E(R_A)$ = 15%

a. Calculation of stock A's beta

We have,

$E(R_A) = R_F + (R_M - R_F)\ \beta_A$

Or, $15 = 5 + [10 - 5]\ \beta_A$

Or, $\beta_A = 2$

Therefore, beta of stock A (β_A) = 2

b. Calculation of new required rate of return of stock A.

$E(R_A) = R_F + (R_M - R_F)\ \beta_A$

$= 5 + [10 - 5]\ 1.5$

$= 12.5\%$

Therefore, new required rate of return of stock A, $E(R_A) = 12.5\%$

Unit 5
Capital Structure and Cost of Capital

Concept of Capital Structure

Organizations have need of funds to run and maintain its business. The requisite funds may be raised from short-term sources or long-term sources or a combination both the sources of funds, so as to equip itself with an appropriate combination of fixed assets and current assets. Current assets to a considerable extent are financed with the help of short-term sources. Net working capital must be financed by long-term sources. Hence, long-term sources of funds are required to finance for both (a) long-term assets (fixed

assets) and (b) networking capital (positive current assets). The long-term financial strength as well as profitability of a firm is influenced by its financial structure. The term 'Financial Structure' refers to the left hand side of the balance sheet as represented by "total liabilities" consisting of current liabilities, long-term debt, preference share capital and equity share capital. The financial structure, therefore, includes both short-term and long-term sources of funds. Specially, the proportion of long term funds denotes the capital structure. Major components of capital structure are debt capital and equity capital.

Financial structure	Current liabilities + Long-term debt + Preferred stock + Common equity
Capital structure	Long-term debt + Preferred stock + Common equity

To maintain the optimum capital structure is the part of financing decision of a firm. The financial manager should maintain the optimum capital structure which can maximize the value of the firm. In general; the mix of debt, common stock, preferred stock and retained earning that minimize the overall average cost of capital is called the optimal capital structure. Hence the composition of equity and debt capital with lower weighted average cost of capital (WACC) is known as optimum capital structure. Majority of economists believe that the optimum capital structure maximizes the value of the firm and reduces the cost of capital. That is optimum capital structure leads to maximization of shareholder wealth. Modigliani and Miller, on the other hand, argue that in perfect capital market, capital structure does not affect value of the firm.

The role of capital structure management in maximization of shareholder's wealth is very significant. The combination of debt and equity is very essential for the company. Finding the appropriate mix of debt and equity is crucial. Under normal condition of the economy, the earning per share of the corporation is going to be increased by using higher debt capital than equity capital. But higher leverage parallel increase the financial risk of the shareholders. The cost of debt is less expensive than equity because it is fixed income security. The required return to compensate debt holder is less than the required return to compensate equity investors. Hence debt capital is seemed to be cheaper than the equity capital. But the corporation has to bear the fixed amount of obligation for the repayment of periodic interest as well as repayment of principal amount at the maturity of debt. Similarly in general equity financing is seemed to be expensive and it also divides the share of profit. But not only profit it also shares the risk. It helps to redistribution of risk among the common stock holders. On the other hand equity financing does not create the compulsory obligation of the periodic dividend and repayment of maturity value. On the same way companies get tax relief on interest, while dividend payments are paid out of after-tax income. In this scenario

sometimes using higher level of debt is beneficial and sometimes; higher equity is beneficial.

There is not any hard and fast rule regarding the combination of debt capital and equity capital. Actually maintaining the optimum capital structure is multidimensional phenomenon. It is contingent approach at the same time. This is because the same proportion of capital structure is not suitable for all types of organization. Even same organization needs to vary its capital structure as per the passes of time. Hence the capital structure manage meat is determined by overall economic condition, level of liquidity, status of corporation, market interest rate and so on. Companies with better performance level and consistent cash flows have the much more capacity to tolerate a much larger debt loan. Such types of company can generate the better value by holding higher percentage of debt in their capital structure. On the other hand, a company with volatile cash flow faces difficulties to fulfill the compulsory obligation of periodic interest and repayment of maturity value. Therefore; for such corporation a combination of little debt and a large amount of equity is fruitful. Hence we can conclude that capital structure management helps in resolving these conflicting hurdles and plays a critical/vital role in maximizing shareholder wealth.

Optimum Capital Structure

The capital structure is said to be optimum when the firm has selected such a combination of equity and debt so that the wealth of firm (shareholder) is maximum. At this capital structure, the cost of capital is minimum and market price per share is maximum. It is very difficult to find out optimum debt and equity mix where capital structure would be optimum because it is difficult to measure a fall in the market value of an equity shares on account of Increase in risk due to high debt content in capital structure. Hence, in practice, the expression "appropriate capital structure" is more realistic expression than 'optimum capital structure'. Following are the features of an appropriate capital structure:

- **Profitability:** The most profitable capital structure is one that tends to minimize cost of financing and maximize earning per equity share.
- **Flexibility:** The capital structure should be such that company can raise funds whenever needed.
- **Conservation:** The debt content in the capital structure should not exceed the limit, which the company can bear.
- **Solvency:** The capital structure should be such that firm does not run the risk of becoming insolvent.

- **Control:** The capital structure should be so devised that it involves minimum risk of loss of control of the company.

Cost of Capital

A firm can collect the funds from different sources of capital to meet its financing need. The sources of capital may be debt, preferred stock, common stock, etc. These capitals are not free of cost. These different forms of capital may have different costs associated with them. Cost of capital is the minimum required rate of return which a firm must earn on its investment in order to satisfy the invertor. It is the weighted average cost of various sources of finance used by a firm. Cost of capital is also called target rate or standard return or required rate of return or hurdle rate or cut off rate. The cost of different sources of capital collectively is known as weighted average cost of capital or simply cost of capital. The cost of specific sources of capital is known as components of cost of capital or specific cost of capital. The concept of cost of capital is very important in the financial management. The firm's cost of capital is very important because managers must know the cost of capital, often called minimum required rate of return in making capital budgeting decision; helping to establish the optimal capital structure, and making decision such as leasing, bond refunding and working capital management.

Significance of cost of capital

The concept of cost of capital is very important in the financial management. Its plays a crucial role in both capital budgeting as well as decisions relating to planning of capital structure. Cost of capital concept can also be used as a basis for evaluating the performance of a firm. It helps management in taking various financial decisions. The importance of cost of capital can be explained as under:

i. **Determination of Capital Structure:** Cost of capital influences the capital structure of a firm. In designing optimum capital structure i.e. the proportion of debt and equity, due importance is given to the overall or weighted average cost of capital of the firm. The objective of the firm should be to choose such a mix of debt and equity so that the overall cost of capital is minimized.

ii. **Capital Budgeting Decisions:** Proper estimate of cost of capital is important for a firm in taking capital budgeting decisions. Generally, cost of capital is the discount rate used in evaluating the desirability of the investment projects. In the internal rate of return method, the project will be accepted if it has a rate of return greater than the cost of capital. In calculating the net present value of the expected future cash flows from the project, the cost of capital is used as the rate of discounting. The investment project having positive NPV is selected. Therefore, the concept of cost of capital is very useful in capital budgeting decision. For this reason, cost of capital is also referred to as cutoff rate, target rate, hurdle rate, minimum required rate of return etc.

iii. **Maximization of the Value of the Firm:** For the purpose of maximization of value of the firm, a firm tries to minimize the average cost of capital. There should be judicious mix of debt and equity in the capital structure of a firm so that the business does not to bear undue financial risk.

iv. **Management of Working Capital:** In management of working capital, the cost of capital may be used to calculate the cost of carrying investment in receivables and to evaluate alternative policies regarding receivables. It is also used in inventory management.

v. **Dividend Decisions:** Cost of capital is significant factor in taking dividend decisions. The dividend policy of a firm should be formulated according to the nature of the firm i.e. whether it is a growth firm, normal firm or declining firm. However, the nature of the firm is determined by comparing the internal rate of return (r) and the cost of capital (k) i.e., $r > k$, $r = k$, or $r < k$ which indicate growth firm, normal firm and decline firm, respectively.

vi. **Decisions regarding Leasing:** Estimation of cost of capital is necessary in taking leasing decisions of business concern.

vii. **Evaluation of Financial Performance:** The concept of cost of capital can be used to evaluate the financial performance of top management. This can be done by comparing the actual profitability of the investment project undertaken by the firm with the overall cost of capital.

Components of cost of capital

The capital used by a firm may be in the form of debt, preference capital, retained earnings and equity shares. The cost of specific sources of capital is known as components of cost of capital or specific cost of capital. Following are the components of capital:

1. Cost of debt (K_d)
2. Cost of preferred stock (K_p)
3. Cost of common stock or cost of equity (K_s or K_e)
    a. Cost of internal equity (K_s)
    b. Cost of external equity (K_e)

Cost of debt (K_d)

Capital structure of a firm normally includes the debt component also. Debt may be in the form of debentures, bonds and loan from bank and financial institutions. The rate of interest on debt (called coupon interest rate) is fixed. Interest on debt capital is charge against profit. It is tax deductible expenditure. Cost of debt may be defined as the minimum required rate of return which a firm must earn on borrowed capital. It is the rate of return required by the firm's creditors. There are mainly following types of debt capital:

i. Perpetual debt or irredeemable debt

The debt which does not have any specific maturity period is known as perpetual debt or irredeemable debt. Cost of irredeemable debt can be computed by dividing annual coupon interest by net proceeds from the debt instrument. The before tax cost of perpetual debt is found out by using the following equation:

$$K_d = \frac{I}{NP}$$

$$K_{dt} = K_d (1 - T)$$

Where,

K_d = Before tax cost of debt

I = Coupon interest in Rs

NP = Net proceeds from the issue of the bond

= Market price of the bond – floatation cost

T = the firm's marginal tax rate

K_{dt} = After tax cost of debt.

Illustration 1

Everest Paper Company has issued Rs 1,000 face value bond with a 10% coupon at 5% discount. The cost of floatation of bonds is Rs 20 per bond. The company's taxation rate is 40%. Calculate the cost of debt.

Solution

Coupon interest (I) = 10% of Rs 1000 = Rs 100

Net proceeds (NP) = Issues price - floatation cost = Rs 950 – 20 = Rs 930

Cost of debt before tax (K_d) = $\frac{I}{NP} = \frac{100}{930}$ = 0.1075 or 10.75%

Cost of debt after tax (K_{dt}) = K_d (1 - T) = 10.75 (1 - 0.4) = 6.45%

ii. Redeemable debt

The debt capital issued with specified maturity period is called redeemable debt. A firm has to pay periodic interest at the end of each period and principal sum after the maturity period. Cost of redeemable debt can be found by using the following equation:

$$K_d = \frac{I + \frac{MV - NP}{n}}{\frac{MV + 2NP}{3}}$$

$$K_{dt} = K_d (1 - T)$$

Where,

I = Coupon or interest amount

MV = Maturity value

K_d = Before tax cost of debt

K_{dt} = After tax cost of debt

n = Maturity period

T = the firm's marginal tax rate.

NP = Net proceeds from the issue of the bond

Illustration 2

ABC Company can sell a 10-year, Rs 1000 face value bond with 9 percent coupon at Rs 960. An underwriting fee of 2 percent of face value would be incurred in the issue process. Assume corporate tax rate is 30 percent. What is the after-tax cost of debt?

Solution

Given,

Face value (MV) = Rs 1,000

Maturity period (n) = 10 years

Annual coupon interest (I) = 9% of 1,000 = Rs 90

Price of bond = Rs 960

Flotation costs = 2% of 1000 = Rs 20

Tax rate (T) = 30% = 0.30

Net proceed (NP) = Issue price – Flotation cost = Rs 960 – Rs 20 = Rs 940

We know,

$$\text{Before tax cost of debt } (K_d) = \frac{I + \frac{MV - NP}{n}}{\frac{MV + 2 \times NP}{3}} = \frac{90 + \frac{1000 - 940}{10}}{\frac{1000 + 2 \times 940}{3}} = \frac{96}{960} = 0.10 \text{ or } 10\%$$

Therefore, after-tax cost of debt (K_{dt}) = K_d (1 – T) = 10(1 – 0.30) = 7%

iii. Zero coupon bonds

The bonds having no coupon payments over the life but the maturity value is repaid at the end of maturity period and initially issued at a discounted price are known as zero coupon bonds. The cost of zero coupon bonds can be computed by using the following equation.

$$Kd = \left[\frac{MV}{NP}\right]^{1/n} - 1$$

$$K_{dt} = K_d (1 - T)$$

Where,

MV = Maturity value

K_d = Before tax cost of debt

K_{dt} = After tax cost of debt

n = Maturity period

T = the firm's marginal tax rate.

NP = Net proceeds from the issue of the bond

Illustration 3

Everest Paper Company issues a zero coupon bond having a 10 year maturity and Rs 1,000 face value. If the price of the bond is Rs 226.68, calculate required rate of return on the bond.

Solution:

Given,

Par value (MV) = Rs 1,000

Net proceeds (NP) = Rs 226.68

Years to maturity (n) = 10 year

Required rate of return (Kd) = ?

We have,

$$Kd = \left[\frac{MV}{NP}\right]^{1/n} - 1 = \left[\frac{1000}{226.68}\right]^{1/10} - 1 = 0.16 \text{ or } = 16\%$$

Hence, required rate of return on the bond is 16%.

Cost of Preferred Stock

Cost of preferred stock is the rate of return expected by preference shareholder on their investment. In other words, it is the minimum rate of return that must be earned on the preference shareholder's investment to satisfy their required rate of return.

i. Perpetual / Irredeemable preferred stock

The preference share which does not have maturity date is called irredeemable or perpetual preferred stock. It has infinite maturity period. The cost of perpetual preferred stock can be computed by using the following equation:

$$Kp = \frac{D_P}{NP}$$

Where,

Kp = Cost of preferred stock

Dp = Preference dividend

NP = Net proceeds of preferred stock

Illustration 4

Janakpur Air plans to issue Rs 100 par preferred stock with an 12% dividend. The stock is selling on the market for Rs 90 and Janakpur Air must pay floatation costs of 5% of the market price. What is the cost of preferred stock for Janakpur Air?

Solution

Preference dividend (Dp) = 12% of Rs 100

= 12

Price of preferred stock = Rs 90

Floatation cost = 5%
Net proceeds (NP) = Rs 90 - 5% of Rs 90 = Rs 85.50

Cost of preferred stock (Kp) $= \frac{D_P}{NP} = \frac{12}{85.50} = 0.1403$ or 14.03%

ii. Redeemable preferred stock

The preference share with a definite maturity period is called redeemable preferred stock. A redeemable preferred stock makes periodic equal dividend payment at the end of each period and principal amount at maturity. Cost of redeemable preferred stock can be computed by using following formula,

$$Kp = \frac{D_P + \frac{MV - NP}{n}}{\frac{MV + 2NP}{3}}$$

Where,

Dp = Preference dividend
MV = Maturity Value
n = Years to maturity
Kp = Cost of preferred stock
NP = Net proceeds of preferred stock

Illustration 5

National Bank plans to issue Rs 100 par; 12% dividend preferred stock with 10 years maturity. Preferred stock can be sold at Rs 120 in the market. The company must pay floatation cost of 5% of the market price. What is the cost of preferred stock for National Bank?

Solution

Preference dividend (Dp) = 12% of Rs 100 = Rs 12
Face value (MV) = Rs 100
Net proceeds (NP) = Rs 120 - 5% of Rs 120 = Rs 114
Years to maturity (n) = 10 years
Cost of preferred stock (Kp) = ?

$$Kp = \frac{D_P + \frac{MV - NP}{n}}{\frac{MV + 2NP}{3}} = \frac{12 + \frac{100 - 114}{10}}{\frac{100 + 2 \times 114}{3}} = \frac{10.60}{109.33} = 0.097 \text{ or } 9.7\%$$

Cost of Common Stock/ Cost of Equity

Cost of common stock may be defined as the minimum rate of return that a company must earn on the equity financed portion of an investment project so that market price of the shares remains unchanged. Firms may raise equity capital internally by retaining earnings and externally by issuing new common shares. In both cases, common shareholders are providing funds to the firms either by forgoing dividends which could have been distributed to them or by purchasing new shares. Therefore, common shareholder's required rate of return will be the same. However, external equity will cost more to the firm than internal equity because of floatation cost on new shares.

i. Cost of retained earnings / cost of existing stock / cost internal equity

Retained earnings are one of the major sources of financing for the established company. These are the funds accumulated over years of the company by keeping part of the funds generated without distribution. The equity shareholders of the company are entitled to these funds. Cost of retained earnings is the rate of return common shareholders required on equity capital that the firms obtain by retaining the earnings. Following three alternative approaches can be used to determine the cost of existing stock or cost of internal equity or cost of retained earnings:

a. Discounted cash flow approach/dividend yield plus capital yield approach.

$$Ks = \frac{D_1}{P_0} + g$$

Where,

D_1 = Expected dividend or dividend at end of the year.

$D_1 = D_0 (1 + g)$

D_0 = Last year dividend or dividend at beginning of the year

P_0 = Current market price

g = Growth rate

b. Capital assets pricing model (CAPM]

$$K_S = R_F + (R_M - R_F)\,\beta_S$$

Where,

R_F = Risk free rate of return

R_M = Market rate of return or return on average stock

$R_M - R_F$ = Market risk premium

β_S = Beta coefficient of the stock.

iii. Bond yield plus risk Premium approach

Ks = Bond yield + Risk premium

Note : Risk premium may range from 3 to 5 percent (average 4%)

ii. Cost of external or new equity (Ke) : Cost of external equity or new common equity can be calculated as follows :

$$Ke = \frac{D_1}{NP} + g$$

Where, NP = Net proceeds or current market price less floatation cost.

Illustration 6

The earnings, dividends and stock price of National Technologies are expected to grow at 7 percent per year after this year. National's common stock sells for Rs 25 per share, its last dividend was Rs 2 and the company will pay a dividend of Rs 2.14 at the end of the current year.

a. Using the discounted cash flow approach, what is the cost of retained earnings?
b. If the firm's beta is 1.6, the risk free rate is 9% and the average return on the market is 13%, what will be the firm's cost of equity using CAPM approach?
c. If the firm's bonds earn a return of 12%, what will be the cost of equity using the bond-yield –plus-risk premium approach?

Solution:

a. Growth rate (g) = 7%

Last year's dividend per share (D_0) = Rs 2

Expected dividend per share (D_1) = D_0 (1+g) = 2 (1 + 0.07) =Rs. 2.14

Market price per share (Po) = Rs 25

Cost of internal equity (Ks) = ?

$$Ks = \frac{D_1}{P_0} + g = \frac{2.14}{25} + 0.07 = 0.1568 \text{ or } 15.68\%$$

b. Risk free rate (K_{RF}) = 9%

Marker rate of return (K_m) = 13%

Beta co-efficient (β) = 1.6

Cost of retained earnings (Ks) = ?

$$Ks = K_{RF} + (K_m - K_{RF})\beta = 9 + (13 - 9)\ 1.6 = 9 + 6.4 = 15.4\%$$

c. Risk premium = 4%

Bond yield = 12%

Cost of retained earnings (Ks) = ?

Ks = Bond yield + risk premium = 12 + 4 =16%

Illustration 7

The United Company's common stock is currently trading at Rs 125 a share. New stock can be sold to net the firm Rs 120. The company's next expected dividend is Rs 9 per share and the dividend is expected to grow a constant rate of 5% per year. What is the cost of external equity?

Solution

Expected dividend (D_1) = Rs 9
Growth rate (g) = 5%
Market price per share (Po) = Rs 125
Net Proceeds (NP) = Rs 120
Cost of external equity (Ke) = ?

$$Ke = \frac{D_1}{NP} + g = \frac{9}{125} + 0.05 = 0.125 \text{ or } 12.5\%$$

Weighted Average Cost of Capital (WACC)

When specific costs are combined to arrive at overall cost of capital, it is called weighted average cost of capital. It is also called combined cost of capital or composite cost of capital or simply cost of capital. The weighted average cost of capital is computed by using either book value or market value weights. The use of market value weights for calculating cost of capital is more appealing than the use of book value weights because market value of securities closely approximate the actual amount to be received from their sale and component costs of capital are calculated using the market price.

$$WACC = W_d . K_{dt} + W_p . K_p + W_s . K_s + W_e . K_e$$

Where,

W_d = Weight of debt
W_p = Weight of preferred stock
W_s = Weight of existing common stock
W_e = Weight of new common equity.

Marginal Cost of Capital

The weighted average cost of new or incremental capital is known as marginal cost of capital. Marginal cost of capital increases each time as and when cost of one of capital component increases. The marginal cost of capital plotted against amount raised on the graph is called MCC schedule. MCC schedule shows the relationship between new capital raised and cost of that capital. There is a break in MCC schedule each time when one of cost of capital component increases. Break point is the rupee volume of new capital that can be raised before an increase in the firm's weighted marginal cost of capital. Breakpoints are defined as the total financing that can be done before the firm is forced to sell new debt or equity capital. Break point can be calculated as follows:

a. Break point caused by retained earnings

$$\text{Break point (equity)} = \frac{\text{Retained earnings}}{\text{Weight of equity}}$$

WACC below break point = $W_d . K_{dt} + W_p . K_p + W_s . K_s$
WACC above break point = $W_d . K_{dt} + W_p . K_p + W_e . K_e$

b Break point caused by debt capital

$$\text{Break point (debt)} = \frac{\text{Amount of lowest cost of debt}}{\text{weight of debt}}$$

c. Break point caused by preferred stock

$$\text{Break point (preferred stock)} = \frac{\text{Amount of lowest prefered stock}}{\text{Weight of prefered stock}}$$

Illustration 8

Janakpur Shoe Enterprises is financed by two sources of funds; bonds and common stock. The capital structure consists of Rs. 3 million worth of bonds and Rs.7 million worth of stock. The bonds have a 14 percent yield to maturity, and the stock is expected to pay Rs. 5 in dividends this year and current market price of stock is Rs.70. The growth rate of dividends has been 11 percent and is expected to continue at the same rate. Find the cost of capital if the corporation tax rate on income is 40 percent.

Solution:

Worth of bonds = Rs. 3 million

Worth of stock = Rs. 7 million

Yield to maturity (K_d) = 14%

Expected total dividend = Rs. 5

Current market price of stock (P_0) = Rs.70

Growth rate on dividends (g) = 11%

Corporate tax rate (T) = 40%

Cost of capital (WACC) = ?

$$\text{Weight of debt capital } (W_d) = \frac{3 \text{ Million}}{10 \text{ Million}} = 0.30$$

$$\text{Weight of equity capital } (W_S) = \frac{7 \text{ Million}}{10 \text{ Million}} = 0.70$$

After tax cost of debt (K_{dt}) = K_d (1 - T) = 14% × (1 - 0.40) = 8.40%

$$\text{Cost of common stock } (K_S) = \frac{D_1}{P_0} + g = \frac{5}{70} + 0.11 = 0.1814 \text{ or } 18.14\%$$

$$WACC = W_d \times K_{dT} + W_S \times K_S$$
$$= 0.30 \times 8.4\% + 0.70 \times 18.14\%$$
$$= 15.218\%$$

Unit 6
Capital Budgeting

Capital budgeting

Capital budgeting may be defined as the managerial decision making process to acquire new fixed assets, to invest in new projects, to expand existing business, to introduce new strategic business unit in an organization. It describes the firm's formal planning process for the acquisition and investment of capital and results in a capital budget that is the firm's formal plan for the expenditure of money to new project. The process of capital budget includes identification of investment opportunities or ideas, generation of investment proposals, estimation of cash inflows and outflows for the proposals, evaluation of capital projects proposals and approval the projects. Capital budgeting is the process of evaluating and selecting long term investing. Long term investment or capital budgeting project refers to the long term assets which benefits spreads over a number of year. Capital budgeting process involves following steps:

1. Identification of capital budget projects.
2. Estimation of project benefits and cost (cash inflow and cash out flow)
3. Evaluation of projects.
4. Development of capital expenditure budget based on project acceptation criteria

Types of Projects

Independent Projects

Independent projects serve different purposes and do not compete with each other. In other words, the projects whose cash flows are not related with each other are called independent projects. Projects can be evaluated independently and firm can make decision without considering the cash flows of another project. Under independent projects, a firm can accept all the projects if they are profitable. At the same time, firm can reject all the projects, if they are not profitable.

Mutually Exclusive Projects

Under the mutually exclusive projects, only one project among all available alternative projects can be accepted. If one investment is undertaken, others will have to be excluded. Therefore, the firm selects one best project from the available alternatives.

Estimation of Cash Outflow and Cash Inflow

1. **Estimation of cash out flow at zero year/Net cash outlay/ Net investment/ Cost of projects**

Net Cash Outlay

Particular	Amount
Purchase price of new machine	(XXX)
Installation and Transportation cost	(XXX)
Additional or Increasing in working capital	(XXX)
Net sale proceeds from old machine today	XXX
Decrease in working capital	XXX

Investment tax credit	XXX
Net Cash Outlay	**(XXX)**

Net proceeds from sale of old machine today

Cash salvage value today (Sales price)	XXX
Less : Tax outstanding(Gain × Tax rate)	XXX
Or,	
Add : Tax saving(Loss × Tax rate)	(XXX)
Net Sales Proceeds	XXX

Note: Gain (loss) : Cash salvage value – Book salvage value.

2. Differential Depreciation

Depreciation on new machine	XX
Less depreciation on old machine	XX
Differential Depreciation	**XX**

3. Calculate of Annual cash inflow after tax (CFAT)

Details	**New Assets**	**Old Assets**	**Differential**
Net Sales revenue	XXX	XXX	XXX
Less : Cash expenses	XXX	XXX	XXX
EBDT or CFBT	XXX	XXX	XXX
Less : depreciation	XXX	XXX	XXX
Earning before tax	XXX	XXX	XXX
Less : tax @	XXX	XXX	XXX
Earning after tax	XXX	XXX	XXX
Add : Depreciation	XXX	XXX	XXX
CFAT	XXX	XXX	XXX

Note:

Increase in revenue or saving in expenses is differential earnings before depreciation and tax (EBDT).

4. Calculation of Final Year (CFAT)

Annual CFAT (Differential)	XXX
Add : Increase in working capital released	XXX
Less : decrease in working capital tied up	(XXX)
Add : Differential cash salvage value at end	XXX
Add : Tax saving (loss × tax rate)	XXX
Less : Tax outstanding (Gain × tax rate)	(XXX)
Final year CFAT	**XXX**

Techniques of Capital Budgeting

A. Traditional method:

1. Payback Period (Payback period)
2. Average rate of return

B. Modern method:

3. Discounted payback period
4. Net present value
5. Profitability index
6. Internal rate of return
7. Modified internal rate of return

1. Pay Back Period (PBP)

It is the number of required time to recover the initial investment. So, it looks the length of time required for a project to breakeven on its net investment. Payback period can be computed in the following two different situations. In case of independent project, the project having payback period is less than standard payback period is selected. In case of mutually exclusive projects, the project having minimum payback period is selected. This method is simple to understand and easy to calculate. This method considers profitability but ignores liquidity and time value of money.

(a) When annual CFAT is even

$$\text{Payback period} = \frac{\text{Net cash outlay}}{\text{Annual CFAT}}$$

(b) When annual CFAT is uneven

$$\text{Payback period} = \text{Minimum year} + \frac{\text{Amount uncovered}}{\text{CFAT of the next year}}$$

Illustration 1

You have provided the cost of two projects and their cash flows.

Year	0	1	2	3	4
Project A	(Rs 10,000)	Rs 3,000	Rs 3,000	Rs 3,000	Rs 3,000
Project B	(Rs 10,000)	Rs 4,000	Rs 3,500	Rs 3,000	Rs 5,000

Required: Calculate the payback period of each project.

Solution

For project A

$$\text{Payback period (PBP)} = \frac{\text{Net cash outlay}}{\text{Annual CFAT}} = \frac{10000}{3000} = 3.33 \text{ years}$$

For project B

Calculation of cumulative cash flows

Year	Cash flow	Cumulative CF
1	4,000	4,000
2	3,500	7,500
3	3,000	10,500
4	5,000	15,500

Payback period (PBP) = Minimum year + $\frac{\text{Amount uncovered}}{\text{CFAT of the next year}}$ = 2 + $\frac{2500}{3000}$ = = 2.83 years

2. ACCOUNTING RATE OF RETURN (ARR)

The ratio of average net income (earning after tax) to average investment is known as accounting rate of return. It is also known as the return on investment or average rate of return. The project having greater ARR is selected. This method is simple to understand and easy to calculate. This method considers profitability but ignores liquidity and time value of money.

(a) When annual CFAT is even

$$\text{ARR} = \frac{\text{Annual Net Income}}{\text{Average Investment}} \times 100$$

(b) When annual CFAT is uneven

$$\text{ARR} = \frac{\text{Average Net Income}}{\text{Average Investment}} \times 100$$

Where,

$$\text{Average net income} = \frac{\text{Total net income}}{\text{No. of years}}$$

$$\text{Average investment} = \frac{\text{Net cash outlay}}{2}$$

Illustration 2

You have provided the cost of two projects and their cash flows.

Year	0	1	2	3	4
Project A	(Rs 10,000)	Rs 3,000	Rs 3,000	Rs 3,000	Rs 3,000
Project B	(Rs 10,000)	Rs 4,000	Rs 3,500	Rs 3,000	Rs 5,000

Required: Calculate Accounting Rate of Return.

Solution

For project A

$$\text{Annual Depreciation} = \frac{\text{Net cash outlay}}{4} = \frac{10000}{4} = \text{Rs. } 2{,}500$$

Annual net income = Annual CFAT – Annual Dep. = Rs. 3,000 – Rs. 2,500 = Rs. 500

$$\text{Average investment} = \frac{10000}{2} = \text{Rs. } 5{,}000$$

$$ARR = \frac{\text{Annual Net Income}}{\text{Average Investment}} \times 100 = \frac{500}{5000} \times 100 \quad = 10\ \%$$

For project B

Year	CFAT	Annual Depreciation	Net income
1	4,000	2,500	1,500
2	3,500	2,500	1,000
3	3,000	2,500	500
4	5,000	2,500	2,500
			5,500

$$\text{Average net income} = \frac{\text{Total net income}}{\text{No. of years}} = \frac{5500}{4} = \text{Rs. } 1{,}375$$

$$\text{Average investment} = \frac{10000}{2} = \text{Rs. } 5{,}000$$

$$ARR = \frac{\text{Annual Net Income}}{\text{Average Investment}} \times 100 = \frac{1375}{5000} \times 100 \quad = 27.5\ \%$$

3. DISCOUNTED PAYBACK PERIOD

Discounted payback period considers the time value of money. It can be defined as the number of years required to recover the investment from discounted cash flow after tax. So, this method is similar to the regular payback period except that it discounts cash flow at the project cost of capital.

$$\text{Discounted Payback period (DBP)} = \text{Minimum year} + \frac{\text{Amount uncovered}}{\text{Discounted CFAT of the next year}}$$

Illustration 3

Consider the following two projects where cash flows of project A are equal and cash flows of project B are unequal.

Year	Project A	Project B
0	-12,000	-12,000
1	4,000	3,500
2	4,000	3,000
3	4,000	4,000
4	4,000	4,000
5	4,000	6,000

Required: Calculate discounted payback period of each project.

Solution

For Project A

Year	CFAT	PVIF @ 12%	Discounted CFAT	Cum. DCFAT
1	4,000	0.8929	3,572	3,572

2	4,000	0.7972	3,189	6,761
3	4,000	0.7118	2,847	9,608
4	4,000	0.6355	2,542	12,150
5	4,000	0.5674	2,270	14,420

$$\text{Discounted Payback period (DBP)} = \text{Minimum year} + \frac{\text{Amount uncovered}}{\text{Discounted CFAT of the next year}}$$

$$= 3 + \frac{2392}{2542} = 3.94 \text{ years}$$

For Project B

Year	CFAT	PVIF @ 12%	Discounted CFAT	Cum. DCFAT
1	3,500	0.8929	3,125	3,125
2	3,000	0.7972	2,392	5,517
3	4,000	0.7118	2,847	8,364
4	4,000	0.6355	2,542	10,906
5	6,000	0.5674	3,404	14,310

$$\text{Discounted Payback period (DBP)} = \text{Minimum year} + \frac{\text{Amount uncovered}}{\text{Discounted CFAT of the next year}}$$

$$= 4 + \frac{1094}{3404} = 4.32 \text{ years}$$

4. NET PRESENT VALUE (NPV)

Net present value can be defined as the total present value of estimated CFAT minus Net cash outlays (NCO). Hence, this method requires finding the present value of the expected net cash flows of an investment, discounted at the cost of capital and subtracting it from the NCO of project. For independent projects, the projects having positive present value are accepted and projects having negative NPV are rejected. For mutually exclusive projects, the project having highest positive NPV is accepted.

NPV = Total present value - Net cash outlay

Illustration 4

You have provided the cost of two projects and their cash flows.

Year	**0**	**1**	**2**	**3**	**4**
Project A	(Rs 10,000)	Rs 3,000	Rs 3,000	Rs 3,000	Rs 3,000
Project B	(Rs 10,000)	Rs 4,000	Rs 3,500	Rs 3,000	Rs 5,000

Cost of capital is 10%.

Required: Calculate Net Present Value of each project.

Solution

For Project A

Year	CFAT	PVIF @ 10%	PV
1 to 4	3,000	3.1699	9,509.70

NPV = Total present value - Net cash outlay

= Rs. 9,509.70 - Rs. 10,000 = – Rs. 490.30

For Project B

Year	CFAT	PVIF @ 10%	Present value
1	4,000	0.9091	3,636.4
2	3,500	0.8264	2,892.4
3	3,000	0.7513	2,253.9
4	5,000	0.6830	3,415.0
Total Present value			12,197.7
Less: NCO			10,000
NPV			2,197.7

5. Profitability index

Profitability index is the ratio of total present value (PPV) of cash inflows and net cash outlay. For independent projects, The project having the PI greater than one is accepted. For mutually exclusive projects, the project that has the highest PI is accepted. When net investments on two alternative projects are equal, both net present value and profitability index will give the same result. This method is superior than NPV method when net investments on two alternative projects are not equal.

$$\text{Profitability index} = \frac{\text{Total present V of Cash inflows}}{\text{Net cash outlay}}$$

Illustration 5

You have provided the cost of two projects and their cash flows.

Year	**0**	**1**	**2**	**3**	**4**
Project A	(Rs 10,000)	Rs 3,000	Rs 3,000	Rs 3,000	Rs 3,000
Project B	(Rs 10,000)	Rs 4,000	Rs 3,500	Rs 3,000	Rs 5,000

Cost of capital is 10%.

Required: Calculate Profitability index of each project.

Solution

For Project A

Year	CFAT	PVIF @ 10%	PV
1 to 4	3,000	3.1699	9,509.70

$$\text{Profitability index} = \frac{\text{Total present V of Cash inflows}}{\text{Net cash outlay}} = \frac{9509.70}{10000} = 0.95$$

For Project B

Year	CFAT	PVIF @ 10%	Present value
1	4,000	0.9091	3,636.4

2	3,500	0.8264	2,892.4
3	3,000	0.7513	2,253.9
4	5,000	0.6830	3,415.0
Total Present value			12,197.7

Profitability index = $\frac{\text{Total present V of Cash inflows}}{\text{Net cash outlay}} = \frac{12197.7}{10000} = 1.22$

6. Internal rate of return

The rate of return at which total present value of cash inflows is equal to net cash outlay is known as internal rate of return. In other words, the discounting rate at which net present value (NPV) is zero is known as internal rate of return. The project having internal rate of return more than cost of capital is selected.

(a) When CFAT is even

Step I: Find out true factor

$$\text{True factor} = \frac{\text{Net Cash Outlay}}{\text{Annual CFAT}}$$

Step II: Locate the true factor in PVIFA table. If true factor will actually match in the table for n years, the corresponding rate will be IRR. If the true factor does not match in the table, find out the factors at low rate and high rate.

At low rate → XX (must be more than true factor)

At high rate → XX (must be less than true factor)

Step III: Find out IRR by using interpolation technique

$$\text{IRR} = \text{LR} + \frac{\text{Factor}_{LR} - \text{true factor}}{\text{Factor}_{LR} - \text{Factor}_{HR}} \times (\text{HR} - \text{LR})$$

(b) When CFAT is uneven

Step 1 Find out nearest factor

$$\text{Nearest factor (PVIFA)} = \frac{\text{Net cash out lay}}{\text{Average CFAT}}$$

Step 2 Find out nearest rate by looking at PVIFA table.

Step 3 Calculate total present values at nearest rate. If total present value is greater than NCO, try another high rate to find out total present value less than NCO. But if total present value is less than NCO, try at low rate to find out present value greater than NCO.

TPV at low rate - XX (must be more than NCO)

TPV at high rate - XX (must be less than NCO)

Step 4 Find out IRR by using interpolation technique

$$IRR = LR + \frac{TPV_{LR} - NCO}{TPV_{LR} - TPV_{HR}} \times (HR - LR)$$

Illustration 6

Assume that there are two projects X and Y. Each projects net cash outlays is Rs. 10,000 and the cost of capital for both project is 12%. The expected cash flows are given as:

Year	Project X	Project Y
0	(10,000)	(10,000)
1	3,500	4,500
2	3,500	3,500
3	3,500	3,500
4	3,500	3,000

Required: Internal Rate of Return of each project.

Solution

Project X

$$\text{True factor} = \frac{NCO}{\text{Annual CFAT}} = \frac{10,000}{3,500} = 2.8571$$

Factor at 14% - 2.9137

Factor at 15 % - 2.8550

$$IRR = LR + \frac{Factor_{LR} - \text{true factor}}{Factor_{LR} - Factor_{HR}} \times (HR - LR)$$

$$= 14\% + \frac{2.9137 - 2.8571}{2.9137 - 2.8550}(15 - 14) = 14.9523\ \%$$

For Project Y

$$\text{Nearest factor} = \frac{NCO}{\text{Average CFAT}} = \frac{10,000}{3,625} = 2.7586$$

Nearest rate = 16%

Calculation of Total Present Value

Year	CFAT	PVIF at 16%	PV	PVIF at 19%	PV
1	4,500	0.8621	3,879.45	0.8403	3,781.35
2	3,500	0.7432	2,601.20	0.7062	2,471.70
3	3,500	0.6407	2,242.45	0.5934	2,076.90
4	3,000	0.5523	1,656.90	0.4987	1,496.10
		Total	10,380.00		9,826.05

$$IRR = LR + \frac{TPV_{LR} - NCO}{TPV_{LR} - TPV_{HR}} \times (HR - LR)$$

$$= 16 + \frac{10380 - 10000}{10380 - 9826.05} \times (19 - 16) \quad = 18.06\ \%$$

7. Modified internal rate of return (MIRR)

Under this method, cash inflows are converted into future value (Terminal value) compounding at the firm's cost of capital. The discounting rate at which terminal value is equal to net cash outlay is known as modified internal rate of return. In case of independent project, the project having MIRR greater than required rate of return is accepted. In case of mutually exclusive projects, the project having the highest MIRR is accepted.

$$\text{MIRR} = \left[\frac{\text{Terminal value}}{\text{Net cash outlay}}\right]^{1/n} - 1$$

Illustration 7

You are given the following information regarding Project A:

Year	Cash Flow Rs.
0	(15,000)
1	1,000
2	2,000
3	4,000
4	5,000
5	8,000

The rate of return is 10%.

Required: Calculate the Modified Internal Rate of Return.

Solution:

Calculate the terminal value of cash flows

Year	Cash Flow	FVIF at 10%	Terminal Value
1	1,000	1.4641	1,464
2	2,000	1.331	2,662
3	4,000	1.21	4,840
4	5,000	1.1	5,500
5	8,000	1	8,000
Total Terminal Value			22,466

$$\text{MIRR} = \left[\frac{\text{Terminal value}}{\text{Net cash outlay}}\right]^{1/n} - 1$$

$$\text{MIRR} = \left[\frac{22466}{15000}\right]^{1/5} - 1 = 1.0841 - 1 = 0.0841 \text{ or } 8.41\ \%$$

Conflicts between Net Present Value and Internal Rate of Return

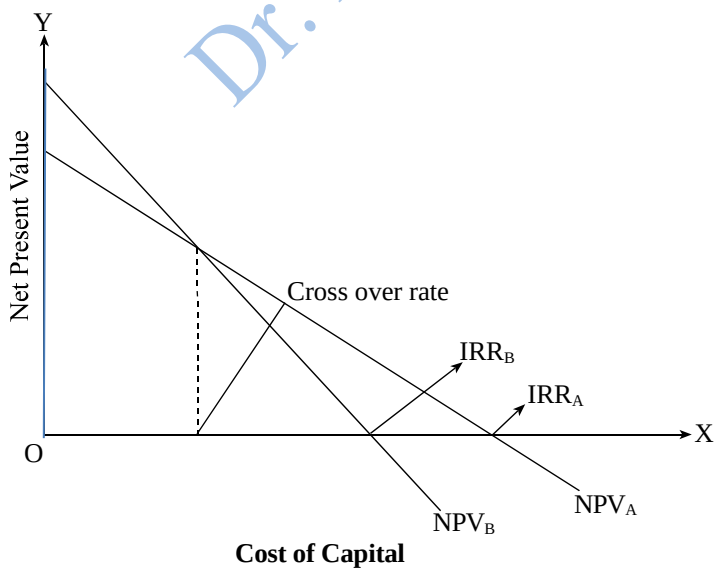
The NPV and the IRR methods may lead to conflicting rankings. Which method provides the best result? To answer this question, the main conflicts between NPV and IRR must be examined, along with the problems associated with each of the methods. The conflicts arise mainly in comparing mutually exclusive projects (projects capable of performing the same function). The evaluation of mutually exclusive projects by the NPV and the IRR methods can lead to at least three problems:

1. The problem when the mutually exclusive projects have different initial outlays is called the scale effects problem.
2. The problem when the mutually exclusive projects have a different timing of cash flows is called the timing effects problem.
3. The problem when the mutually exclusive projects have different lives is called the live effects problem.

Other problems arise from possible multiple rates of return when using the IRR method.

Net Present Value Profile

The graph showing the firm's cost of capital and project net present value is known as NPV profile. In other words, the curve which shows the relationship between cost of capital and net present value of the project is called net present value profile. The discounted rate at which net present value of two projects is equal is known as cross over rate.



Calculation of Cross Over Rate

1. Find out differential NCO

2. Find out differential CFAT
3. Calculate IRR (cross over rate) from differential NCO and differential CFAT.

Unit 7
Dividend Policy

Dividend Policy

Dividends refer to that portion of a firm's net earnings which are paid to shareholders. Since dividends are distributed out of the profits, the alternative to the payment of dividends is the retention of earnings. The retained earnings constitute an important source of financing the investment requirements of the firm. There is inverse relationship between retained earnings and cash dividends. More dividends result in smaller retentions whereas lesser dividend results in larger retentions. Thus, dividends and retained earnings are competitive and conflicting.

Dividend decisions refer to the decisions regarding the division of net earnings to the dividend and retained earnings. A firm can distribute all of its earnings to the shareholders as dividends or can retain all of its earnings for re investment as retained earnings or can distribute a part of earnings as dividend and retain the balance for re-investment purpose. Dividend decision is a major financial decision in the sense that a firm has to choose between distributing profits to the shareholders and ploughing back them into the business. The selection would be influenced by the effect on the objective of financial management of maximizing shareholder's wealth.

Given the objective of financial management of maximizing shareholder's wealth, the firm should be guided by the consideration as which alternative use of net earnings is consistent with the goal of wealth maximization. If paying dividends to shareholders will maximize the wealth of shareholder, the firm would be advised to use earnings for paying dividends to shareholders. The firm would be advised to retain the earnings if retaining earning will end to the maximization of wealth. Thus, optimal dividend policy is one which leads to maximization of wealth of owners.

There are conflicting opinions regarding the impact of dividends on the valuation of a firm. According to one school of thought, called irrelevance theory of dividend, dividends are irrelevant so that amount of dividends paid has no effect on the valuation of a firm. This thought is led by Modigiliani and Miller. According to MM Hypothesis, dividend policy has no effect on the value of the firm. On the other hand, certain theories consider the dividend decision as relevant to the value of the firm. The

dividend decision has effect on the value of the firm. This view is led by J.E. Walter, M.J. Gordon and others.

The arguments given are support of irrelevance theory of dividend seems not to be hold true. Therefore, it should be concluded that dividend policy is relevant. A firm should try to follow an optimum dividend policy which maximizes the shareholder's wealth in long run. An optimum dividend policy will vary from firm to firm as it is determined by a number of factors.

Dividend Payout Ratio and Retention Ratio

Dividend policy decision refers to the decision to pay out earnings or to retain them for reinvestment in the firm Dividend refers to the portion of net income paid out to the shareholders. The percentage of earnings paid out in form of cash dividend is known as dividend payout ratio. Dividend payout ratio can be calculated as under.

$$\text{Dividend Payout ratio} = \frac{\text{Dividend paid}}{\text{Net income}} \text{ or } \frac{\text{DPS}}{\text{EPS}}$$

Where,

$$\text{Dividend per share} = \frac{\text{Dividend paid}}{\text{No. of common shares outstanding}}$$

$$\text{Earnings per share} = \frac{\text{Net income}}{\text{No. of common shares outstanding}}$$

A firm may retain same portion of its earnings for reinvestment purpose. The percentage of earnings retained in the firm is called retention ratio. High dividend payout ratio means low retention ratio and vice versa. Retention ratio is calculated as under:

$$\text{Retention ratio} = \frac{\text{Retained earnings}}{\text{Net income}} \text{ Or, 1 - Dividend Paid out ratio}$$

Illustration 1

A company has net income of Rs 4,00,000 this year. It retained Rs 1,60,000 of those earning for investment purpose. It has 40,000 shares outstanding.

Required :

(i) Earnings per share

(ii) Dividend per share

(iii) Total dividend

(iv) Dividend payout ratio

(v) Retention ratio

Solution

Net income = Rs 4,00,000

Retained earnings = Rs 1,60,000

No. of shares = 40,000

(i) Earning per share $= \frac{\text{Net income}}{\text{No. of common shares outstanding}} = \frac{400000}{40000} =$ Rs 10

(ii) Dividend Paid = Net income - Retained earnings
= 4,00,000 - 1,60,000 = Rs 2,40,000

(iii) Dividend per share $= \frac{\text{Dividend paid}}{\text{No. of common shares outstanding}} = \frac{240000}{40000} =$ Rs 6

(iv) Dividend payout ratio $= \frac{\text{Dividend paid}}{\text{Net income}} = \frac{240000}{400000} = 0.60$ or 60%

(v) Retention ratio = 1 - dividend payout ratio = 1 - 0.60 = 0.40 or 40%

Dividend Payment Procedures

Cash dividend refers to the portion of net income paid out to shareholders in cash. The dividend payment procedures of a company can be described as under:

1. Declaration date: The date at which board of directors meet and issue a statement declaring dividend is called declaration date. The board of directors set the amount of dividend to be paid, the holder - of - record date and the payment date on this date. Generally, dividend is announced as a percentage of the par value of stock. However, it can be the absolute amount like Rs 5 per share in some cases.

2. Holder - of - record date: The date on which the company opens the ownership books to make a list of shareholders who are entitled to receive the dividend is called holder - of - record date. All the stockholders of the record date are entitled to receive the dividend declared by the board of directors. The new stockholders would receive dividend if the name of shareholders is recorded in the ownership book on or before the date of record. However, if the notification about the transfer was received after the date of record, the old owner of the stock would receive the dividends.

3. Ex - dividend date: Ex-dividend date is two business days prior to the record date. Shares purchased after the ex-dividend date are not entitled to the dividend. The transaction must take place before the ex-dividend date to entitle the new holder to receive dividend. Thus, the date when the right to the dividend leaves the stock for new owner is called ex-dividend date.

4. Payment date: The date on which the company actually pays dividends or mails the cheques to the stockholders is called payment date. On this date, the company actually pays the dividend to all the stockholders of the date of record.

Dividend Payout Schemes

A firm can pay dividends using either residual dividend policy or stable dividend policy.

1. Residual dividend policy

Residual dividend policy is based on the assumption that investors prefer to have a firm retain and reinvest earnings rather than pay our them in dividends. Under residual dividend policy, a firm pays dividend only after meeting its investment need at desired debt - equity ratio. This policy is based on the following assumption:

(a) The firm wishes to minimize the need of external equity.

(b) The firm wishes to maintain its current capital structure.

Under residual dividend policy, if the net income exceeds the portion of equity financing, then the excess of net income over equity need is paid as dividend. The company does not pay any dividend when net income is less than or equal to equity need for financing the investment proposals. In case, net income is not sufficient to meet equity need, the company should raise deficit amount by external equity. Following steps should be followed to determine amount of dividend under residual dividend policy :

(a) Determine the optimal capital budget.

(b) Find out target equity ratio in capital structure

Target equity ratio = 1 - Debt ratio.

(c) Determine the amount of equity required to finance the optimal capital budget.

Equity financing required = Optimal Capital Budget × Target equity ratio

(d) Pay dividends if earnings are more than equity financing required.

Dividends = Net income - (Capital budget × Target equity ratio)

Illustration 2

National Corporation has a target capital structure that consists of 60% debt and 40% equity. The company anticipates that its capital budget for the upcoming year will be Rs 3,00,000. If the company reports net income of Rs 2,00,000 and it follows a residual dividend policy, what will be its dividend payout ratio?

Solution

Target debt ratio = 60%
Target equity ratio = 40%
Capital Budget = Rs 300,000
Net income = Rs 2,00,000

Under residual dividend policy,

Dividends = Net income - (Capital budget × Target equity ratio)
= 200000 - (300000 × 0.40) = 200000 – 120000 = Rs 80,000

Dividend payout ratio $= \frac{\text{Dividend paid}}{\text{Net income}} = \frac{80000}{200000} = 0.40$ or 40%

2. Stable dividend policy

Stability or regularity of dividend is considered as a desirable policy by the management of most companies because stable dividends have a positive impact on the market price of the share. Following are the most commonly used constant dividend policies:

(a) Constant dividend per share : Under this policy, a fixed amount of dividend per share is paid on annual basis irrespective of earnings of the company. The earnings may fluctuate from year to year but dividend per share remains unchanged. However, it does not mean that dividend per share never be increased. Dividend per share can be increased when the firm can sustain the higher level.

(b) Constant payout ratio: Under this policy, a fixed percentage of the net earnings are paid as dividends every year. If earnings vary, the amount of dividend also varies from year to year. If earnings increase, dividends also increase and if earnings decrease, dividends also decrease. Dividends are paid when profits are earned. No dividend is paid when the firm suffers loss in any year.

(c) Regular dividend plus extra dividend policy: Under this policy, a minimum constant dividend per share is fixed and additional dividend is paid over the regular low dividends in the years of relatively high earnings. This policy is a compromise between constant dividend per share and constant payout ratio policy. The low regular dividend is maintained even when earnings decline and extra dividends can be paid when earnings are more.

Forms of Dividend

Cash Dividend

When dividend is distributed to shareholders in cash out of the earnings of the company, it is called cash dividend. When cash dividend is distributed, both total assets and net worth of the company decrease. Total assets decrease as cash decreases and net wealth decreases as retained earnings decrease. The market price per share also decreases in most cases by the amount of cash dividend distributed.

Marker price per share after cash dividend = Marker price per share before cash dividend - Cash dividend per share.

Stock Dividend / Bonus Shares

Stock dividend refers to the dividends paid to the existing stockholders in the form of additional shares of common stock. It represents a distribution of additional shares to existing shareholder. Stock dividend increases the number of outstanding shares of the firm's stock. It involves simply an accounting entry transfer from retained earnings account to the common stock and paid in capital accounts. Due to stock dividend, retained earnings decrease, common stock and paid in capital increase. The stock dividend does not affect the equity position of stockholders. Market price per share and earning per share after stock dividend will decrease.

No. of bonus shares = No. of shares outstanding × % of stock dividend.

Decrease in Retained earnings = No. of bonus shares × Market price per share.

Increase in common stock = No. of bonus shares × par value per share.

Increase in paid in capital = No. of bonus shares × paid in capital per share.

Marker price per share after stock dividend

$$= \frac{\text{Market price per share before cash dividend}}{1 + \text{sock dividend in fraction}}$$

Illustration 3

The Janaki Rice Mills has the following shareholder's equity account :

Common stock (Rs 10 par value)	2,00,000
Additional Paid in Capital	2,00,000
Retained earnings	4,00,000
Shareholder' equity	8,00,000

Market price of the stock is Rs 40 per share

(a) Reformulate the shareholders equity account if the company declares 20% stock dividend

(b) What will be the share price after 20% stock dividend?

Solution

(a)

Common stock (24000 shares of Rs 10)	2,40,000

Additional Paid in Capital	3,20,000
Retained earnings	2,40,000
Shareholder' equity	8,00,000

Working Notes :

Addition bonus shares = 20,000 × 20% = 4,000
Increase in common stock = 4,000 × 10 = Rs 40,000
Increase in paid in capital = 4000 × 30 = Rs 1,20,000
Decrease in retained earnings = 4000 × 40 = Rs 1,60,000

(b) Market price per share after stock dividend

$$= \frac{\text{Market price per share before cash dividend}}{1 + \text{sock dividend in fraction}} = \frac{40}{1 + 0.20} = \text{Rs } 33.33$$

Stock Split

A stock split is a method to reduce the marker price per share by giving certain number of share for one old share. Due to stock split, number of outstanding shares increase and par value and marker price of the stock decrease. A stock split affects only the par value, market value and the number of outstanding shares. However, net worth of the company remains unaltered.

With a stock split, shareholder's equity account does not change, but the par value per share changes. The earnings per share will be diluted and marker price per share fall proportionately with a stock split. But, the total value of the holdings of a shareholder remains unaffected by a stock split. Following ate the reasons for splitting a firm's ordinary shares:

1. Stock split results in reduction in market price of the share. It helps in increasing the marketability and liquidity of a company's shares.
2. Stock splits are used by the company management to communicate to investors that the company is expected to earn higher profits in future.
3. Stock split is used to give higher dividends to shareholders.

Illustration 4

XZY Company has the following shareholder's equity account.

Common stock (10000 shares of Rs 100 each)	10,00,000
Additional Paid in Capital	10,00,000
Retained earnings	20,00,000

Shareholder' equity	40,00,000

The current market price per share is Rs 400 each.

(a) Reformulate the shareholder's equity account if the company split their shares two - for - one

(b) What will the marker price per share after stock split?

Solution

(a) Shareholder's equity after stock split

Common stock (20000 shares of Rs 50)	10,00,000
Additional Paid in Capital	10,00,000
Retained earnings	20,00,000
Shareholder' equity	40,00,000

(b) Marker price per share after stock split = Rs 400 × $^1/_2$ = Rs 200.

Reverse Stock Split

Reverse stock split is method used to raise marker price of a firm's stock by exchanging certain number of outstanding shares for one new share of stock. Due to reverse stock split, number of outstanding shares decreases, par value of the shares increases and marker price per share also increases. However, total net worth of the company remains unchanged. Reverse stock split is used to stop the marker price per share below a certain level. The reverse split is generally an indication of financial difficulty and is, therefore, intended to increase the marker price per share.

Illustration 5

XYZ Company has the following shareholder's equity account

Common stock (20000 shares of Rs 50)	10,00,000
Additional Paid in Capital	5,00,000
Retained earnings	5,00,000
Shareholder' equity	20,00,000

What will happens to this account and no. of shares outstanding with a 1-for-2 reverse stock split?

Solution

Shareholder's equity Account

Common stock (10000 shares of Rs 100)	Rs. 10,00,000
Additional Paid in Capital	Rs. 5,00,000
Retained earnings	Rs. 5,00,000
Shareholder' equity	Rs. 20,00,000
No. of Shares	Rs. 10,000

Repurchase of Stock

Stock repurchase is method in which a firm buys back shares of its own stock, thereby decreasing shares outstanding, increasing earnings per share, and, often increasing the stock price. It is an alternative to cash dividends. In a stock repurchase, the company pays cash to repurchase shares from its shareholders. These shares are usually kept in the company's treasury and then resold when the company needs money.

If a firm has excess cash, it may purchase its own stock leaving fewer shares outstanding, increasing the earning per share and increasing the stock price. It may be an alternative to paying cash dividends. The benefits to the shareholders are the same under cash dividend and stock repurchase. In the absence of personal income taxes and transaction costs, both cash dividend and stock repurchase have no any difference to shareholders. Capital gain arising from repurchase should equal the dividend otherwise would have been paid. Repurchase price or equilibrium price is the price that brings capital gain equal to the cash dividend. Share price for repurchase or the equilibrium price is calculated from the following equation:

$$\text{Repurchase Price } (P^*) = \frac{S \times Pc}{S - n}$$

Where,

S = Total number of shares outstanding

P_c = Current market price per share

n = Number of shares to be repurchased.

Illustration 6

A company has Rs 16,00,000 in excess funds. The company wishes to distribute these funds to repurchase the stock. Presently, it has 4,00,000 shares outstanding and the market price per share is Rs. 36. It wishes to repurchase 10% of its stock or 40000 shares.

a. Assuming no signaling effect, at what price should the company offer to repurchase?
b. In total, how much will the company be distributing through share repurchase?

c. If the company were to pay out the funds through cash dividend instead, what will be the market price per share after the distribution?

Solution

(a) Current market price (P_c) = Rs 36

No. of shares outstanding (S) = 4,00,000

No. of shares repurchased (n) = 40,000

Required repurchase price (P*) = ?

$$\text{Repurchase Price (P*)} = \frac{S \times Pc}{S - n} = \frac{400000 \times 36}{400000 - 40000} = \text{Rs } 40$$

Assuming no signaling effect, the company should offer to repurchase its stock at Rs.40.

(b) The company will be distributing Rs 16,00,000 (40,000 × Rs 40) through share repurchase.

$$\text{(c) Cash dividend per share} = \frac{\text{Dividend paid}}{\text{No. of shares}} = \frac{1600000}{400000} = \text{Rs } 4$$

Marker price per share after cash dividend = Rs 36 - 4 = Rs 32.

Unit 8

Working Capital Management

Concept of Working Capital

There are two concepts of working capital:

1. **Gross concept:** According to gross concept, working capital refers to the firm's investment in current assets. Current assets are those assets which can be converted into cash within an accounting year and include cash, A/R, inventories, marketable security etc. This concept lays emphasis on quantitative aspects of current assets management.

   Gross Working Capital = Total Current Assets

   = Cash & Marketable securities + Account Receivable + Inventories

2. **Net concept:** According to net concept, the difference between current assets and current liabilities is called working capital. In other words, working capital refers to that part of current assets which are financed by long term fund. This concept of working capital lays emphasis on two qualitative aspects of current asset management: liquidity position of the firm and permanent sources of fund and working capital..

   Net Working Capital = Current Assets – Current Liabilities

Working Capital Management

Working capital management involves the administration of current assets and current liabilities. It is concerned with the problems which arise in attempting to manage the current assets, current liabilities and inter-relationship which exist between them. Working capital management is an important topic for financial manager. The basic objective of working capital management is to manage current assets and current liabilities is such a way that optimum level of net working capital is maintained. The important of WC Management can be highlighted by following points:

i. The largest portion of financial manager's time is devoted to the day to day internal operation of the firm which falls under the heading of WC management.
ii. Current assets represent a large proportion of total assets. Moreover, current assets fluctuate with sales and sales vary over time. Thus, managing current assets is a dynamic process.
iii. Working capital management has greater significance for small firms. A small firm may not have much investment in fixed assets. But it has to invest in current assets.
iv. Working capital management is also important for the view of maintaining continuous cash flow.

Working Capital Policy

Working capital policy refers to the decisions related with the target level of each type of current assets and how current assets can be financed. It involves the following two basic issues:

- Working capital investment policy
- Working capital financing policy

Working capital investment policy

Working capital investment policy refers to the decision relating to target level of each type of current assets. There are three types of working capital investment policy.

(i) Relaxed or conservative working capital policy: Under this policy, a firm holds relatively large amount of each type of current assets. A conservative policy has lower risk as well as lower return.

(ii) Restricted or Aggressive working capital policy: Under this policy, the holding of each type of current assets are minimized. An aggressive policy produces higher return and higher risk.

(iii) Moderate working capital policy: The moderate working policy is between the two extremes i.e. relaxed and restricted working capital policy. The moderate working capital policy produces moderate level of risk and return.

Working capital financing policy

Working capital financing policy refers to the decision relating to how the current assets will be financed. There are three types of working capital financing policies.

(i) Conservative approach: Under this approach, the firm finances permanent current assets and a part of temporary current assets with long term fund. Conservative policy has lower risk as well as lower return.

(ii) Aggressive Approach: Under this approach, some permanent current assets and all temporary current assets are financed with short term fund (current liabilities). There is more risk and return under this policy.

(iii) Moderate Policy/Matching Approach: Under this policy, permanent current assets are financed by long term fund and temporary current assets are financed by short term fund. There is moderate level of risk and return under this policy.

Balance Sheet

	Conservative	**Moderate**	**Aggressive**
Fixed assets	XX	XX	XX
Current assets	XX	XX	XX
Total assets	**XX**	**XX**	**XX**
Current liabilities	XX	XX	XX
% long term debt	XX	XX	XX
Common equity:			
Common Stock	XX	XX	XX
Retained Earnings	XX	XX	XX
Total liabilities & equity	**XX**	**XX**	**XX**

Income Statement

EBIT	XX	XX	XX
Less: Interest	XX	XX	XX
Profit before tax	XX	XX	XX
Less: Tax @	XX	XX	XX
Net income	XX	XX	XX
Return on equity	XX	XX	XX

$$\text{Net profit margin} = \frac{\text{Net income}}{\text{Sales}}$$

$$\text{Total assets turnover} = \frac{\text{Sales}}{\text{Total assets}}$$

$$\text{Return on Assets (ROA)} = \frac{\text{Net income}}{\text{Total Assets}}$$

$$\text{Return on Equity (ROE)} = \frac{\text{Net income}}{\text{Common equity}}$$

According to Du Pont Equation:

ROA = Net Profit margin × Total assets turn over

ROE = Net Profit margin × Total assets turn over × Equity multiplier

Cash Conversion Cycle / Working Capital Cash Flow Cycle

Cash conversion cycles is the length of time between paying for raw materials purchased and receiving cash from the sale of finished goods. In other words, cash conversion cycle refers to the length of time necessary to complete inventory conversion period, receivable conversion period and payable deferral period. It measures the length of time the firm has funds tied up in working capital.

CCC = ICP + RCP – PDP

Operating Cycle = ICP + RCP

Where,

CCC = Cash conversion cycle

ICP = Inventory conversion period

RCP = Receivable conversion period

PDP = Payable deferral period

Working capital required = CCC × Working capital per day

Working Capital per day = Production units per day × variable cost per unit

$$\text{Working Capital Turnover} = \frac{\text{Cost of goods sold or Sales}}{\text{Working Capital}}$$

(i) Inventory Conversion Period or Age of Inventory: It may be defined as the length of time required to convert raw material into finished goods and then to sell these goods.

$$\text{ICP} = \frac{\text{Days in a year}}{\text{Inventory turnover}}$$

Or,

$$\text{ICP} = \frac{\text{Days in year} \times \text{Inventory}}{\text{Cost of goods sold or Sales}} = \frac{\text{Inventory}}{\text{Cost of goods sold or sales per day}}$$

(ii) Receivable Conversion Period/Days sales outstanding/ Average collection Period: It may be defined as the length of time required to convert account receivable into cash.

$$\text{RCP} = \frac{\text{Days in a year}}{\text{Receivable turnover}}$$

Or,

$$RCP = \frac{\text{Account Receivable} \times \text{Days in a year}}{\text{Credit Sales}} = \frac{\text{Account Receivable}}{\text{Credit Sales per day}}$$

(iii) Payable Deferral period: It may be defined as the length of time between the purchase of material and payment of cash for it.

$$\text{Payable Deferral Period} = \frac{\text{Account payable} \times \text{Days in a year}}{\text{Credit purchases}}$$

Or,

$$= \frac{\text{Account payable}}{\text{Credit purchase per day}}$$

Illustration 1

The Goma Corporation has an inventory conversion period of 70 days, a receivable collection period of 35 days and a payable deferral period of 30 days.

a. What is the length of the firm's cash conversion cycle?
b. If Goma's annual sales are Rs. 3,500,000 and all sales are in credit, what is the firm's investment in accounts receivable?
c. How many times per year does Goma turn over its inventory?

Solution:

Inventory conversion period (ICP) = 70 days
Receivable collection period (RCP) = 35 days
Payable deferral period (PDP) = 30 days

a. Calculation of cash conversion cycle

Cash conversion cycle = ICP + RCP – PDP
= 70 days + 35 days – 30 days = 75 days

b. Investment in Account Receivable

Annual sales = Rs. 3,500,000

$$\text{Account receivable} = \frac{\text{RCP} \times \text{Sales}}{\text{Days in year}}$$

$$= \frac{35 \times \text{Rs.}3{,}500{,}000}{360} = \text{Rs.}340{,}277.78$$

c. Inventory turnover

$$\text{Inventory turnover ratio} = \frac{\text{Days in year}}{\text{ICP}} = \frac{360 \text{ days}}{70} = 5.14 \text{ times.}$$

Cash Management

The term cash with reference to cash management is used in two senses. In a narrow sense, it includes only currency and generally accepted equivalent of cash such as check and draft. The broad view of cash also includes near cash assets such as marketable

securities and bank time deposit. Cash is taken as the basic input of business transaction. There should be sufficient amount of cash in business but it does not mean excess. That means, there should be appropriate cash balance i.e. neither excess nor shortage. When a form holds cash in excess than necessary, it increases opportunity cost. The opportunity cost of excess cash (held in current account) is the interest income that can be earned in next best use such as investment in marketable securities. If there is shortage of cash, organization has to face many problems regarding to the payment of for general expenses, labor expenses, material expenses and other operating and administrative expenses. Sometimes company has to borrow the fund at higher interest rate for immediate payment.

Cash management is concerned with maintaining required level of cash so as to keep the firm sufficiently liquid. It involves managing the money of the firm in order to maximize cash availability and interest income on idle funds. The primary goal of cash management is to reduce the amount of cash balance held to minimum necessary level to conduct the business operations. Cash management is concerned with the efficient collection and disbursement of cash. The basic issue of cash management is to enable a firm to maintain sufficient liquidity and improve the profitability.

Motives for Holding Cash

There are three motives for holding cash and marketable securities. They are;

a. **Transaction Motive:** Firstly, a business needs cash to meet its regular commitments of paying its account payable, its employees, labors, its tax, its interest obligation, its annual dividend to its shareholders and so on. This reason for holding cash is known as Transaction Motive.
b. **Precautionary Motive:** The second motives for holding cash are Precautionary Motives. It is nothing more just the additional cash balance over the transaction motive which is kept for contingencies in future. It is held to meet the unexpected payment in future. This means, there is a need to maintain a buffer of cash for unforeseen contingencies.
c. **Speculative Motive:** Firms may also hold the cash keeping speculation motive in mind. The prime objective of the firm in this regard is to take the advantages from the price change, attractive interest rate and favorable exchange rate fluctuation. It helps them to get the benefit in the event of decrease in price of raw material interest rate on borrowed fund etc.
d. **Compensating Balance requirement:** Firms should also hold the cash to meet the compensating balance requirement demanded by the banks and financial institutions. Generally, bank and financial institutions demand certain

percentage of loan amount borrowed by the firm to maintain as compensating balance.

Planning and Controlling of Cash

Following are the techniques of planning and controlling of cash:

1. Cash Budget: Cash budget is an estimate of future cash inflows and cash outflows for each period of budgeted period. The essence of preparing budget is to determine whether there is surplus or a deficit of cash at given point of time.

Cash Budget
For the period ……..

Particulars		1st month	2nd month
	Opening cash balance	XX	XX
Add:	**Cash inflows:**		
	Cash sales	XX	XX
	Collection from customers:		
	…% of month sales	XX	XX
	…% of last month sales	XX	XX
	Income receivable	XX	XX
	Sales of assets	XX	XX
	Issue of shares/Debentures	XX	XX
	Other cash receipt	XX	XX
(A)	**Total Cash Available**	**XX**	**XX**
Less:	**Cash out flows** :		
	Cash purchases	XX	XX
	Payment to creditors	XX	XX
	Payment for expenses	XX	XX
	Dividend paid	XX	XX
	Payment for tax	XX	XX
	Purchases of assets	XX	XX
	Other cash payment	XX	XX
(B)	**Total Cash Outflows**	**XX**	**XX**
	Surplus/Deficit (A – B)	**XX**	**XX**
Add :	Bank Borrowing	XX	XX
Less :	Payment of Bank borrowing	–	(XX)

Less :	Payment of Interest	–	(XX)
	Ending Cash Balance	**XX**	**XX**

2. Cash flow Synchronization: Cash flow synchronization is a situation in which cash receipts coincide with cash payment. Due to cash flow synchronization, cash balance reduces. It reduces Bank loan requirement, lowers the interest payment and increases the profit.

3. Net Float: The difference between disbursement float and collection float is called net float. Positive net float reduces cash balance requirement, reduces bank loan requirement, lowers the interest payment and increases profit.

Collection float: No. of days required for the collection of payment is defined as collection float. Collection float includes mailing time and processing time. Firms with longer collection float need to maintain large amount of cash balance. Therefore, minimum collection float is favorable for the organization.

Collection float (Rs) = Collection float in days × Average daily collection

Disbursement float: It is the length of time between the issue of check by the firm and payment made by bank. Longer disbursement is favorable for the organization.

Disbursement float (Rs) = Disbursement float in days × Average payment per day.

Illustration 2

Each business day, on average, company writes checks totaling Rs 12,000 to pay its suppliers. The usual clearing time for these checks is five days. Meanwhile, the company is receiving payments form its customers each day, in the form of checks, totaling Rs 15,000. The cash from the payments is available to the firm after three days. Calculate the company's disbursement float, collection float and net float and also interpret the result.

Solution:

Given,

Average payment per day = Rs 12,000

Disbursement float = 5 days

Average daily collection = Rs 15,000

Collection float = 3 days

Calculation of disbursement float:

Disbursement float (Rs) = Disbursement float in days × Average payment per day.

= 5 × Rs12,000 = Rs 60,000

Calculation of collection float:

Collection float (Rs) = Collection float in days × Average daily collection

= 5 × Rs 15,000 = 45,000

Calculation of net float:

Net float = Disbursement float – Collection float

= Rs 60,000 – Rs 45,000 = Rs 15,000

4. Lock Box System: Lock box system is a cash management tool which is used to reduce collection float. The term lock box refers to a post office box to which customers payment are sent rather than to the firm office. Lock box system reduces collection float by avoiding the time required for processing and collection.

Time saved by lock box system = Collection float required in centralized system - collection float required in lock box system.

Reduction in cash balance = Time saved × Average daily collection

Annual benefit of lock box system = Reduction in balance × % cost of capital

Or,

Time saved × Average daily collection × % cost of Capital

Illustration 3

Karnali Corporation (KC) began operations 5 years ago as a small firm serving customers in the Far western. However, its reputation and market area grew quickly, so that today KC has customers throughout the entire nation. Despite its broad customer base, KC has maintained its headquarters in Doti and keeps its central billing system there. KC's management is considering an alternative collection procedure to reduce its mail time and processing float. On average, it takes 5 days from the time customers mail payments until KC is able to receive, process, and deposit them. KC would like to set up a lockbox collection system, which it estimates would reduce the time lag from customer mailing to deposit by 3 days-bringing it down to 2 days. KC receives an average of Rs 1,400,000 in payments per day.

a. How many days of collection float now exits and what would it be under the lockbox system? What reduction in cash balances could KC achieve by initiating the lockbox system?
b. If KC has an opportunity cost of 10 percent, how much it is lockbox system worth on an annual basis?
c. What is the maximum monthly charge KC should pay for the lockbox system?

Solution:

a. Collection float required in centralized system = 5 days

Collection float required in lock box system = 2 days

Time saved by lock box system = Collection float required in centralized system - collection float required in lock box system

= 5 days – 2 days = 3 days

Reduction in cash balance = Time saved × Average daily collection
= 3 days × Rs 14,00,000 = Rs 42,00,000

b. Annual benefit of lock box system = Reduction in balance × % cost of capital
= Rs 42,00,000 ×10% = Rs 420,000

c. Maximum monthly cost of operating lock box system = Rs 420,000 / 12 = Rs 35,000.

5. Decentralized Collection or Concentration Banking: Concentration Banking is a technique used to reduce collection float. It is a system of operating through a number of collection centers instead of a single collection centralized at the firm's head office.
Time saved by concentration bank = Collection float required in centralized system – collection float required in concentration bank.
Reduction in cash balance = Time saved × Average daily collection
Annual benefit of concentration banking=Reduction in cash balance ×% cost of capital

6. Cash Transfer Mechanism: The method used to transfer fund from one place to another place is known as cash transfer mechanism. The main transfer mechanisms are wire transfer and mail depository transfer check system. Wire transfer is the quickest method of transferring fund. It is most expensive method; however, it takes no time to transfer funds. A depository transfer check is less expensive method but is time consuming. The conventional formula for break-even transfer size is as follows.

$$S^* = \frac{\Delta C}{I \times \Delta T}$$

Where,

S^* = Break even transfer size above which wire transfer is profitable.
ΔC = Incremental cost of wire transfer
I = Daily interest rate
ΔT = Difference in transfer time in days

Cash Management Models

1. **Baumol Model/Inventory Model:** Baumol model is an economic model used to determine optimal cash balance. This model balances the opportunity cost of holding cash against the transaction cost. The equation for determining the optimal cash transaction size is as flows :

a. $C^* = \sqrt{\frac{2TF}{K}}$

b. No. of transaction or No. of conversion= $\frac{T}{C^*}$

c. Total cost = Holding cost + transaction cost

$$= \frac{C^*}{2} \times K + \left(\frac{T}{C^*} + M\right) F$$

Where,

C* = Optimal cash transaction size
T = Annual cash requirement
F = Fixed transaction cost/Conversion cost per conversion
K = Opportunity cost or interest rate
M = Minimum cash balance

c. Total conversion cost = $\frac{T}{C^*} \times F$

d. Average cash balance = $\frac{C^*}{2} + M$

e. Total opportunity cost = $\left(\frac{C^*}{2} + M\right) K$

f. Cash cycle = $\frac{360}{\text{No. of conversion}}$ = …….. days

2. **Stochastic or Miller – Orr Model:** It is an improvement over Baumol's model. On the basis of empirical data, Miller and Orr argued that the cash balances fluctuate randomly. It does not follow a constant consumption rate. This model assumes that cash balance is fixed between upper limit and lower limit. Lower limit is determined by management of the value of returned point and upper limit can be calculated by miller.

$$Z^* = \left[\frac{3b\sigma^2}{4i}\right]^{1/3} + \text{Lower limit}$$

Upper limit = 3Z* – 2 Lower limit

Where,

Z* = Return point/average cash balance
Lower limit = minimum cash balance
σ^2 = variance of cash flow
i = interest rate based on daily or weekly basis as per variance.

When cash balance reaches upper limit, amount equal to upper limit minus return point is converted to marketable security which is known as purchase strategy. When cash balance falls to lower limit, amount converted from marketable security to cash is the amount represented by return point minus lower limit. It is called selling strategy.

Illustration 4

KSK Limited provides the following information about its cash management system:

- The annual yield on marketable securities is 15 percent.

- The fixed cost of per transaction of marketable securities transaction is Rs. 2000.
- The standard deviation of the change in daily cash balance is Rs.50,000.
- The minimum cash balance is Rs.50,000.

Required: Calculate return point and upper limit

Solution:

Lower limit or minimum cash balance = Rs 50,000

Variance of cash flow (σ^2) = 5,000 × 5,000 = Rs 25,000,000

Fixed cost per transaction (b) = Rs 2,000

Daily interest rate (i) = 0.15 / 360 =0.0004167

Return point/average cash balance (Z*) = ?

$$Z^* = \left[\frac{3b\sigma^2}{4i}\right]^{1/3} + \text{Lower limit}$$

$$= \left[\frac{3 \times 2000 \times 25000000}{4 \times 0.0004167}\right]^{1/3} + 50{,}000$$

= 44,817 + 50,000 = Rs 94,817

Upper limit = 3Z* – 2 Lower limit

= 3 × 94,817 – 2 × 50,000 = Rs 1,84,451

Inventory Management

Inventory refers to stock file of finished goods of a firm offering for sale and of materials from which finished goods are produced. It is the stock of various forms of raw materials, works-in-progress, finished goods and other supplies used by a firm. A business firm needs raw materials, works-in-progress, finished goods, and other supplies (various forms of inventory) for smooth functioning of production process and sales. Inventory is of following types:

a. **Raw material inventory:** Raw materials are those basic inputs that are converted into finished product through the manufacturing process. Raw materials are the inventories which purchased from suppliers and stored for future production process.
b. **Work in progress inventory:** Work-in-progress inventories are semi-manufactured products. They represent the products that need further processes to produce the finished products for sale.
c. **Finished goods inventory:** Finished goods inventories are those completely manufactured products which are ready for sale. Stocks of raw materials and work-in-progress facilitate for production process where as stock of finished goods is required for smooth marketing function or to fulfill market demand.

d. **Other Supplies:** Other supplies are also important type of inventory. It includes office and plant clearing materials like soap, oil, fuel, light bulbs, lubricants etc. These materials do not directly enter into the production but help in the production process.

Firm should maintain optimum level of inventory for its smooth production and sales operations. Optimum level of inventory means maintaining sufficient inventory and avoiding excessive inventory for smooth running of business at minimum cost. Inventory management is concerned with the administration of inventory. The main objective of inventory management is to keep optimum level of inventory by avoiding over stock and under stock. How much row materials should be purchased, when the order should be placed, what will be the maximum stock level or minimum stock level etc. are included in the inventory management.

Needs for Inventory / Motives of holding Inventory

The basic objective of holding inventories is to maintain an optimum size of inventories of raw materials and work-in-progress for efficient and smooth production and finished goods for uninterrupted sales operation at minimum cost to maximize profitability. Following motives guide a firm to hold inventory.

a. **Transaction motive:** It refers to the holding of inventory to meet the regular demand of materials and finished goods which arise in the ordinary course of business.

b. **Speculative motive:** It refers to the holding of goods to lake advantages of possible fluctuations in the price of goods.

c. **Precautionary motive:** It refers to the holding of goods to meet the shortages due to unforeseen circumstances such as strike, flood, earthquake etc.

Inventory Costs

The overall objectives of inventory management are to minimize the costs associated with inventory. These costs can be classified into the following groups:

1. **Ordering Cost**

The ordering cost is the repurchase cost and it is repeated in nature. It is the cost of placing and receiving the orders. The following costs are included in the ordering costs:

- Cost of staff appointed in the purchasing, inspection and payment departments.
- Cost of stationery purchases, telephone charge, email charge, fax charge, etc.
- Cost of floating tenders, the cost of making comparison among quotations.
- Cost of paper work.
- Cost of transportation, etc.

The total ordering cost is computed as under:

Total ordering costs = Number of orders × Ordering cost per order

$$= \frac{\text{Annual requirement}}{\text{Order Size}} \times \text{Ordering cost per order}$$

$$= \frac{A}{\text{Order Size}} \times O$$

Where,

A = Annual Requirement or Annual Usage or Annual Demand

O = Ordering cost per order

2. Carrying Cost

Carrying cost is concerned with the storing and holding of inventories. It suggests purchasing in small quantities. The following costs are included in the carrying costs:

- Storage charges which includes rent, lighting, heating, etc.
- Interest on capital invested in stock - opportunity cost of capital.
- Store staffing, equipment, maintenance and running costs.
- Material handling costs.
- Audit, stock taking, store recording costs.
- Insurance and security costs.
- Deterioration and obsolescence charges.
- Evaporation and vermin damage costs.

The total carrying cost is computed as under:

Total carrying costs = Average inventory × Carrying cost per unit

$$= (\frac{\text{Order size}}{2} + \text{safety stock}) \times C$$

Where,

C = Annual Carrying Cost per unit

= % carrying cost × Purchase price or cost per unit

3. Total Inventory Costs

Total inventory costs consist of total carrying cost plus total ordering cost. The total inventory costs can be computed as under:

Total inventory costs =Total ordering costs + Total carrying costs

$$= \frac{A}{\text{Order Size}} \times O + (\frac{\text{Order size}}{2} + \text{safety stock}) \times C$$

Illustration 5

The demand for the commodity is 400,000 units a year at a steady rate. It cost Rs. 200 per order and Rs. 40 per year to hold a unit. There is safety stock of 5,000 unit (on hand initially), and order size of the company is 10,000 units per order.

Required: Ordering Cost, Carrying Cost and Total Inventory Cost

Solution:

Annual requirement (A) = 400,000 units.

Ordering cost per order (O) = Rs. 200 per order

Carrying cost per unit (C) = Rs 40

Order size = 10,000 units

Safety stock = 5,000 units

Now,

$$\text{Total ordering costs} = \frac{A}{\text{Order Size}} \times O = \frac{400000}{10000} \times 200 = \text{Rs. } 8{,}000$$

$$\text{Total carrying costs} = \left(\frac{\text{Order size}}{2} + \text{safety stock}\right) \times C$$

$$= \left(\frac{10000}{2} + 5000\right) \times 40 = \text{Rs.}400{,}000$$

Total inventory costs =Total ordering costs + Total carrying costs

= Rs 8,000 + Rs 400,000 = Rs 408,000

Economic Order Quantity (EOQ)

EOQ determines how much should be ordered each time. It is that order size or quantity of inventory at which level total inventory cost is at minimum. Total inventory cost is minimum level at a particular order size where total carrying cot of the inventory is equal to total ordering cost. The order size where total carrying cost is equal to total ordering cost and total inventory cost is at minimum is economic order quantity. It is also known as optimal order quantity It may be defined as the level of inventory order size where total inventory cost is minimum. Total cost is the total of ordering cost and carrying cost. Economic order quantity can be determined using the following methods:-

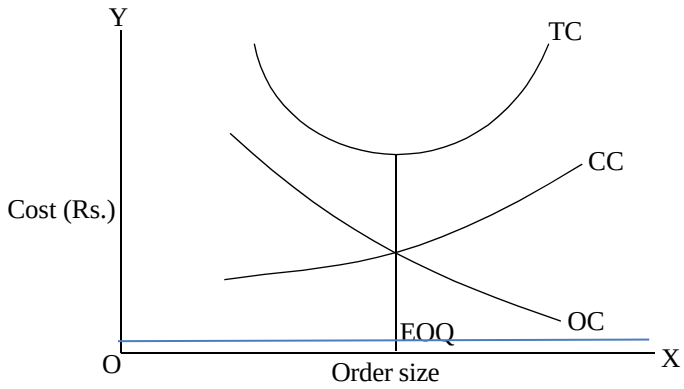
- Graphic Method
- Formula Method / Equation Method
- Tabulation Method / Trial and Error Method

Calculation of EOQ

(a) Graphic Method

Graphic method of EOQ is also known as figure method. It is the graphic representation of different lot sizes and different types of costs. In the figure, order sizes of inventories are shown on X-axis and carrying cost, ordering cost and total costs are shown on Y-axis. If order size increases then the total carrying cost also increases whereas total ordering cost decreases. Total inventory cost curve is at minimum level where total

carrying cost curve and total ordering cost curve are intersected and the respective order size is the economic order quantity.



(b) Equation or Algebraic or Formula Method

Formula method of economic order quantity (EOQ) is also known as equation method. It is simple method to determine EOQ which represents an algebraic relationship between total carrying cost, total ordering cost, and annual requirements.

(i) $EOQ = \sqrt{\frac{2AO}{C}}$

(ii) Optimum no. of orders = $\frac{A}{EOQ}$

(iii) Total cost of EOQ = Ordering cost + carrying cost

$$= \left[\frac{A}{EOQ} \times O\right] + \left[\frac{EOQ}{2} + \text{Safety Stock}\right] \times C$$

(iv) Length of inventory cycle/ Optimum period of supply / time gap between two orders = $\frac{EOQ}{A}$ × No. of periods in a year.

(v) Total cost of given order size = Ordering cost + carrying cost

$$= \left[\frac{A}{\text{Order size}} \times O\right] + \left[\frac{\text{Order size}}{2} + \text{Safety stock}\right] \times C$$

Where,

A = Annual requirement or demand
O = Ordering cost per order
C = Annual carrying cost per unit.

Carrying cost per unit (C) = % carrying cost × purchase price or cost per unit.

(c) Tabular Method: Under this method, a table is prepared showing total cost of different alternative order sizes. The order size having minimum total cost is EOQ.

Calculate of EOQ by Table Method

No. of orders					
Order size					
Average inventory					
Carrying cost					
Ordering cost					
Total cost					

Where,

$$\text{No. of order} = \frac{A}{\text{Order size}}$$

$$\text{Order size} = \frac{A}{\text{no. of orders}}$$

$$\text{Average inventory} = \frac{\text{Order size}}{2}$$

Carrying cost = Average inventory × C
Ordering cost = No. of orders × O
Total cost = Carrying cost + ordering cost

Illustration 6

A firm requires 60,000 units of material per year. Ordering cost per order is Rs 300. Purchase price of material is Rs 5 per unit and carrying cost is 20 percent of the inventory value. What is economic order quantity? What would be total inventory cost at EOQ level?

Solution

Annual requirement (A) = 60,000 units
Ordering cost per order (O) = Rs 300
Purchase Price of material per unit = Rs 5
Carrying cost = 20% of inventory value
Carrying cost per unit per annum (C) = 20 % of Rs 5 = Re 1

$$\text{Economic Order Quantity (EOQ)} = \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 60{,}000 \times 300}{1}}$$

= 6,000 units

$$\text{Total Inventory Cost} = \left[\frac{A}{EOQ} \times O\right] + \left[\frac{EOQ}{2}\right] \times C$$

$$= = \left(\frac{6{,}000}{2}\right)(\text{Re } 1) + \left(\frac{60{,}000}{6{,}000}\right)(\text{Rs } 300) \quad = \text{Rs } 3{,}000 + \text{Rs } 3{,}000 = \text{Rs } 6{,}000$$

Re order level / Re-order point / Ordering Level

Re-order level determines when the order should be placed. It may be defined as the level of inventory when a new order should be placed in order to acquire additional materials.

Re-order level = safety stock + (normal consumption × normal lead time) – goods in transit.

Where,

$$\text{Normal consumption} = \frac{A}{\text{Period in a year}}$$

Lead time: The time required to receive the materials ordered is known as lead time. It is also called re-order period or procurement time or delivery period.

Goods in transit: Goods in transit occurs when length of inventory cycle is less than lead time.

$$\text{No. of orders in transit} = \frac{\text{lead time}}{\text{length of inventory cycle}} = \text{…….. (ignore fraction)}$$

Goods in transit = No. of orders in transit × EOQ

Maximum stock level

It is the maximum level of inventory beyond which inventory level should not exceed.

Maximum level = Re-order level + EOQ – (minimum consumption × minimum lead time)

But when load time is not given

Maximum level = Safety stock + EOQ

Average stock level

It is the level of inventory which a firm keeps on average.

$$\text{Average stock level} = \text{Safety stock} + \frac{EOQ}{2}$$

Evaluation of discount offer

Suppliers offer quantity discount if order is in large quantity. If discount offer is accepted, the firm will have to increase its order size more than EOQ level and increase the average inventory holdings. The firm can save ordering cost and will incur additional carrying costs. Discount is deducted from the total inventory cost to calculate the net inventory cost.

Total cost of offer = Ordering cost + carrying cost – Discount

$$= \left[\frac{A}{\text{Order size}} \times O\right] + \left[\frac{\text{Order size}}{2} + \text{Safety stock}\right] \times C - A \times \text{Cost per unit} \times \text{discount rate}$$

Total cost of EOQ = Ordering cost + carrying cost

$$= \left[\frac{A}{EOQ} \times O\right] + \left[\frac{EOQ}{2} + \text{Safety Stock}\right] \times C$$

If the total cost of offer is less than total cost of EOQ, the offer should be accepted.

Illustration 7

Janakpur Spinning Mill requires 10,000 units of raw materials for the year. Purchase price is Rs 10 per unit. The suppliers offered discount Re 0.06 per unit for the order of 2, 000 units at a time. Its ordering cost is Rs100 per order and carrying cost is 20 percent.

(a) What would be the EOQ and total inventory cost at EOQ level?

(b) What would be the total inventory cost if discount is acceptable? Is discount offer accepted?

Solution

Annual requirement (A) = 10,000 units

Purchase price per unit (P) = Rs 10

Discount offered = Re 0.06 per unit

Ordering cost per order (O) = Rs 100

Carrying cost = 20%

Carrying cost per unit (C) = 20 % of Rs 10 = Rs 2

(a) Economic order quantity (EOQ) $= \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 10{,}000 \times 100}{2}} = 1{,}000$ units

Total inventory cost at EOQ $= \left(\frac{EOQ}{2}\right) \times C + \left(\frac{A}{EOQ}\right) \times O$

$$= \left(\frac{1{,}000}{2}\right) \times \text{Rs } 2 + \left(\frac{10{,}000}{1{,}000}\right) \times \text{Rs } 100 = \text{Rs } 2{,}000$$

(b) If discount offer is accepted:

Order size = 2,000 units

Total cost of offer = Ordering cost + carrying cost – Discount

$$= \left[\frac{A}{\text{Order size}} \times O\right] + \left[\frac{\text{Order size}}{2} + \text{Safety stock}\right] \times C - 10{,}000 \times \text{Rs } 0.06$$

$$= \left(\frac{10{,}000}{2{,}000}\right) \times \text{Rs } 100 + \left(\frac{2{,}000}{2}\right) \times \text{Rs } 2 - \text{Rs } 600$$

= Rs 500 + Rs 2,000 – Rs 600 = Rs 1,900

Discount offer is accepted because its total cost (Rs 1,900) is less than total cost at EOQ (Rs 2,000).

Elasticity of EOQ

EOQ depends upon annual demand, ordering cost and carrying cost. The effect of changes in annual demand or ordering cost or carrying cost on EOQ is known as elasticity of EOQ. Elasticity of EOQ is calculated as follows :

(i) Elasticity of EOQ with respect to annual demand = $\frac{\%\text{ change in EOQ}}{\%\text{ change in annual demand}}$

(ii) Elasticity of EOQ with respect to ordering cost = $\frac{\%\text{ change in EOQ}}{\%\text{ change in ordering cost}}$

(iii) Elasticity of EOQ with respect to carrying cost = $\frac{\%\text{ change in EOQ}}{\%\text{ change in carrying cost}}$

Management of Receivables

Account receivables are created when a firm sales goods on credit rather than on a cash basis. The amount of account receivable depends upon two factors i.e. credit sales per day and credit period allowed to customers.

Account receivable = Credit sales per day × Days Sales Outstanding (DSO)

$$= \frac{\text{Annual credit sales} \times \text{DSO}}{360}$$

$$\text{Investment in Account receivable} = \frac{\text{Cost of sales} \times \text{DSO}}{360}$$

Managing receivable has both direct and indirect cost. But it has also important benefit – granting credit should increase profit. A firm can adopt either loose credit policy or restricted credit policy. The firm adopting loose credit policy can grant credit to those customers also whose financial position is not known. As a result, sales and income on sales increase but credit related costs also increase. The firm adopting tight credit policy is very selectively in grating credit to customers. As a result, sales and income on sales decrease. However, credit related costs also decrease. A financial manager has to select optimum credit policy by balancing income on sales and credit related cost.

Elements of Credit policy

Credit policy is the policy which provide guidelines for determining whether to expand the credit to a customer and how much to extend credit. So, credit policy provides the decision about credit standards, credit terms and collection policy. The firm's credit policy consists of credit standards, credit term, collection policy and monitoring account receivable. These elements of credit policy are explained here under:

1. **Credit Standard**: Credit standard is the criteria that determine which customer will be granted credit. Loose credit standard increases sales, increases bad debt losses and cost of investment in account receivable. Tight credit standard has opposite effects.
2. **Credit Period**: Length of time for which credit is granted is called credit period. Increasing credit period stimulate sales, increases cost of carrying receivables and increases bad debts. Tightening credit period decreases sales, cost of carrying receivables and decreases bad debt losses.
3. **Cash Discount**: Firms offer cash discount to make customers prompt payment. Cash discount will attract the customer to take discount. Liberalizing the cash discount increases sales, reduces day's sales outstanding but increases the cost of discount. Tightening the cost discount has opposite effects.
4. **Collection Policy**: A tight collection policy decreases sales, reduces bad debt losses and increases collection expenses. Loose collection policy has opposite effects.

Credit related costs

a. Bad debts = sales × bad debt percentage

b. Discount = Sales (1 – bad debt fraction) × % discount taking customers × Discount rate

c. Cost of carrying receivable = Investment in account receivable × % opportunity cost

$$= \frac{\text{Cost of sales} \times \text{DSO}}{360} \times \%\ \text{Opportunity cost (Interest rate)}$$

$$= \frac{\text{Sales} \times \text{Variable cost ratio} \times \text{DSO}}{360} \times \%\ \text{Opportunity cost (Interest rate)}$$

Where,

DSO = % Discount taking customer × Discount period + % non - discount customer × Credit period + % late paying customers × late credit period.

Evaluation of Alternative credit Policies

Comparative Income Statement

Particulars	Present policy	Proposed policy	Differential
Sales	XX	XX	XX
Less: Cost of sales	XX	XX	XX
Profit on sales	**XX**	**XX**	**XX**
Less: Credit related cost:			
Cost of carrying receivable	(XX)	(XX)	(XX)
Bad debts	(XX)	(XX)	(XX)
Discount	(XX)	(XX)	(XX)
Collection costs	(XX)	(XX)	(XX)
Profit before tax	XX	XX	XX

Less: Tax @	XX	XX	XX
Net Income	**XX**	**XX**	**XX**

Illustration 8

McDowell Nepal sells on terms of 3/10, net 30. Total sales for the year are Rs. 900,000. 40% of the customers pay on the tenth day and take discounts, the other 60% pay, on average, 50 days after their purchases. Assume 360 days a year.

a. Calculate days sales outstanding.

b. What is the average amount of receivable?

c. What would happen to average receivables if the company toughened up on its collection policy with the result that all non-discount customers paid on the 30th day?

Solution:

Given,

Credit terms = 3/10, net 30;

Total sales = Rs. 900,000

Discount taking customer = 40%

Discount period = 10 days

Non-discount customer = 60%

Credit period for non-discount customer = 50 days.

a. Calculation of Days Sales Outstanding (DSO)

DSO =% of discount taking customer × discount period + % of non-discount customers × Credit period

= 0.40 × 10 days + 0.60 × 50 days = 34 days

b. Calculation of Average amount of receivables

$$\text{Account receivable} = \frac{\text{Sales}}{360} \times \text{DSO}$$

$$= \frac{\text{Rs. } 900{,}000}{360} \times 34 \text{ days} = \text{Rs. } 85{,}000$$

c. Calculation of DSO and Average amount of receivables

DSO =% of discount taking customer × discount period + % of non-discount customers × Credit period

= 0.40 × 10 days + 0.60 × 30 days = 34 days

$$\text{Account receivable} = \frac{\text{Sales}}{360} \times \text{DSO}$$

$$= \frac{\text{Rs. } 900{,}000}{360} \times 22 \text{ days} = \text{Rs. } 55{,}000$$

Illustration 9

The Pokhara Noodles Corporation has annual credit sales of Rs 2 million. Current expenses for the collection department are Rs 30,000, bad debt losses are 2 percent, and the days sales outstanding is 30 days. Pokhara Noodles is considering easing its collection efforts so that collection expenses will be reduced to Rs 22,000 per year. The change is expected to increase bad debt losses to 3 percent and to increase the days sales outstanding to 45 days. In addition, sales are expected to increase to Rs 2.2 million per year.

Should the Company relax collection efforts if the opportunity cost of funds is 12 percent, the variable cost ratio is 70 percent, and its marginal tax rate is 40 percent?

Solution:

Income Statement

Particulars	Present policy	Proposed policy
Sales	20,00,000	22,00,000
Less: Cost of sales (70%)	14,00,000	15,40,000
Profit on sales	6,00,000	6,60,000
Less: Credit related cost:		
Cost of carrying receivable	(12,833)	(21,775)
Bad debts	(40,000)	(60,000)
Collection costs	(30,000)	(22,000)
Profit before tax	517,667	556,225
Less: Tax @	206,867	222,490
Net Income	**310,800**	**333,735**

Decision: Since net income increases by Rs 22,935; the company should relax its collection efforts.

Working notes:

$$\text{Cost of carrying receivable} = \frac{\text{Cost of sales} \times \text{DSO}}{360} \times \%\ \text{Opportunity cost (Interest rate)}$$

Present Policy:

$$\text{Cost of carrying receivable} = \frac{1400000 \times 30}{360} \times 0.11 = \text{Rs } 12{,}833$$

Proposed Policy:

$$\text{Cost of carrying receivable} = \frac{1540000 \times 45}{360} \times 0.11 = \text{Rs } 21{,}775$$