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Paper XVI A : FINANCIAL MANAGEMENT

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Problems and Solutions of Examinations Questions

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LESSON - 1

FINANCIAL MANAGEMENT

—Manju Gupta

Introduction

As we all know that finance is the life blood of an organization. Finance is the art and science of managing money. If the organization want to survive, grow or expand it require funds. This is because in the modern money-oriented economy, finance is one of the basic foundations of all kinds of economic activities. It has rightly been said that business needs money to make more money. However, it is also true that money begets more money, only when it is properly managed. Hence, efficient management of every business enterprise is closely linked with efficient management of its finances. Almost all business activities, directly or indirectly, involve the acquisition and use of funds. For example, recruitment and promotion of employees in production is clearly a responsibility of the production department; but it requires payment of wage and salaries and other benefits, and thus, involves finance. Similarly, buying a new machine or replacing an old machine for the purpose of increasing productive capacity affects the flow of funds.

Importance of finance can be better explained with this true fact. One participant in a course titled, 'Finance for Non-Finance Executives' made a very interesting observation during the discussion. He said "There are no executive development programs titled 'Production Management for Non- Production Executives' or 'Marketing Management for Non-Marketing Executives' and so on. Then, how come books and Executive Development Programs titled 'Finance for Non-Finance Executives' are so popular among managers of all functions like marketing, production, personnel, R&D, etc". The answer is very simple. The common thread running through all the decisions taken by the various managers is money and there is hardly any manager working in any organization to whom money does not matter.

The term financial management can be defined as the management of flow of funds in a firm and it deals with the financial decision making of the firm. It encompasses the procurement of the funds in the most economic and prudent manner and employment of these funds in the most optimum way to maximize the return for the owner. Since raising of funds and their best utilization is the key to the success of any business organization, the financial management as a functional area has got a place of prime relevance. It is concerned with overall managerial decision making in general and with the management of economic resources in particular. All business decisions have financial implications and therefore, financial management is inevitably related to almost every aspect of business operations. Broadly speaking, the financial management includes any decision made by a business/investor that affects its finances.

According to Soloman, "Financial management is concerned with the efficient use of an important economic resource, namely, Capital Funds." Phillippatus has given a more elaborate definition of the term financial management. According to him "Financial management is concerned with the managerial decisions that result in the acquisition and financing of long-term and short-term credits for the firm. As such it deals with the situations that require selection of specific assets (or combination of assets), the selection of specific liability (or combination of liabilities) as well as the problem of size and growth of an enterprise.

The analysis of these decisions is based on the expected inflows and outflows of funds and their effects upon managerial objectives."

Thus, financial management is mainly concerned with the proper management of funds. The finance manager must see that the funds are procured in a manner that the risk, cost and control considerations are properly balanced in a given situation and there is optimum utilization of funds.

Scope of Financial Management

Traditionally, the scope of financial management was very narrow. Initially the finance manager was concerned and called upon at the advent of an event requiring funds. The finance manager was formally given a target amount of funds to be raised and was given the responsibility of procuring these funds. So, his function was limited to raising funds as and when the need arise. Once the funds were procured, his function was over.

In other words, the scope of the finance function was treated by the traditional approach in the narrow sense of procurement of funds by corporate enterprises to meet their financing needs. The term 'procurement' was used in a broad sense so as to include the whole gamut of raising funds externally. Thus defined, the field of study dealing with finance was treated as encompassing three interrelated aspects of raising and administering resources from outside: (*i*) the institutional arrangement in the form of financial institutions which comprise the organisation of the capital market; (*ii*) the financial instruments through which funds are raised from the capital markets and the related aspects of practices and the procedural aspects of capital markets; and (*iii*) the legal and accounting relationships between a firm and its sources of funds.

The traditional approach to the scope of the finance function evolved during the 1920s and 1930s and dominated academic thinking during the forties and through the early fifties. It has now been discarded as it suffers from serious limitations. The weaknesses of the traditional approach were as under:

1. The first argument against the traditional approach was based on its emphasis on issues relating to the procurement of funds by corporate enterprises. This approach was challenged during the period when the approach dominated the scene itself. Further, the traditional treatment of finance was criticised because the finance function was equated with the issues involved in raising and administering funds, the theme was woven around the viewpoint of the suppliers of funds such as investors, investment bankers and so on, that is, the outsiders. It implies that no consideration was given to viewpoint of those who had to take internal financial decisions. The traditional treatment was, in other words, the outsider-looking-in approach. The limitation was that internal decision making (i.e. insider-looking-out was completely ignored.
2. The second ground of criticism of the traditional treatment was that the focus was on financing problems of corporate enterprise. To that extent the scope of financial management was confined only to a segment of the industrial enterprises, as non-corporate organisations lay outside its scope.
3. Another basis on which the traditional approach was challenged was that the treatment as built too closely around episodic events, such as promotion incorporation, merger, consolidation, reorganisation and so on. Financial management was confined to a description of these infre-

quent happenings in the life of an enterprise. As a logical corollary, the day-to-day financial problems of a normal company did not receive much attention.

4. Finally, the traditional treatment was found to have a lacuna to the extent that the focus was on long-term financing. Its natural implication was that the issues involved in working capital management were not in the purview of the finance function.

In other words, its weaknesses were more fundamental. The conceptual and analytical shortcoming of this approach arose from the fact that it confined financial management to issues involved in procurement of external funds; it did not consider the important dimension of allocation of capital. The conceptual framework of the traditional treatment ignored what Solomon aptly described as the central issues of financial management. These issues were reflected in the following fundamental questions which a finance manager should address. Should an enterprise commit capital funds to certain purposes? Do the expected returns meet financial standards of performance? How should these standards be set and what is the cost of capital funds to the enterprises? How does the cost vary with the mixture of financing methods used? In the absence of the coverage of these crucial aspects, the traditional approach implied a very narrow scope for financial management. The modern approach provides a solution to these shortcomings.

Modern Approach

The modern approach broadens the responsibility of finance manager. It views the term financial management in a broad sense and provides a conceptual and analytical framework for financial decision making. According to it, the finance function covers both acquisitions of funds as well as their allocations. Thus, apart from the issues involved in acquiring external funds, the main concern of financial management is the efficient and wise allocation of funds to various uses. The financial manager is required to look into the financial implications of any decision in the firm. Thus, it can be defined in a broad sense, as an integral part of overall management.

The new approach is an analytical way of viewing the financial problems of a firm. The main contents of this approach are: What is the total volume of funds an enterprise should commit? What specific assets should an enterprise acquire? How should the funds required be financed? Alternatively, the principal contents of the modern approach to financial management can be (1) Procuring the required quantum of funds as and when necessary, at the lowest cost. (2)Investing these funds in various assets in the most profitable way, and (3) Distributing returns to the shareholders in order to satisfy their expectations from the firm.

These three functions of the finance manager encompass most of the financial events in any firm. The three questions posed above cover between them the major financial problems of a firm. In other words, the financial management, according to the new approach, is concerned with the solution of three major problems relating to the financial operations of a firm, corresponding to the three questions of investment, financing and dividend decisions.

Finance functions call for skilful planning, control and execution of a firm's activities. Finance decisions can make better the shareholders wealth thus, while performing the finance manger should strive to maximize the market value of shares.

Investment Decision

Investment decisions are the decision relating to asset composition of the firm. Firm has to decide where it will make the investment. The investment can be fall into two broad groups: (i) long - term assets which yields a return over a period of time in future, (ii) short-term or current assets, defined as those assets which in the normal course of business are convertible into cash without diminution in value, usually within a year. The first category of asset is popularly known in financial literature as capital budgeting. The aspect of financial decision making with reference to current assets or short-term assets is popularly termed as working capital management.

Capital Budgeting: Capital budgeting are related with fixed assets of the firm. It is probably the most crucial financial decision of firm. It relates to the selection of an asset or investment proposal or course of action whose benefits are likely to be available in future over the lifetime of the project. The long-term assets can be either new or old existing ones. The earnings of the firm are basically caused by fixed assets composition. The Capital Budgeting decisions are more crucial for any firm. A finance manager may be asked to decide about (1) which asset should be purchased out of different alternative options. (2) To buy an asset or to get it on lease. (3) To produce a part of the final product or to procure it from some other supplier. (4) To buy or not another firm as a running concern. (5) Analysis of risk and uncertainty.

The objective of Capital Budgeting decisions is to identify those assets which are worth more than they cost. A finance manager therefore has to take utmost care in dealing with these decisions.

In brief, the main elements of capital budgeting decisions are: (i) the long-term assets and their composition, (ii) the business risk complexion of the firm and (iii) the concept and measurement of the cost of capital.

Working Capital Management: Working capital management deals with the management of current assets of the firm. It is an important and integral part of financial management as short-term survival is a prerequisite for long-term success. One aspect of working capital management is the trade off between profitability and risk (liquidity). There is a conflict between profitability and liquidity. If a firm does not have adequate working capital that is, if firm does not invest sufficient fund in current assets, it may become illiquid and consequently may not have the ability to meet its current obligations and, thus, invite the risk of bankruptcy. If the current assets are too large profitability is adversely affected. A finance manager has to ensure sufficient and adequate working capital to the firm. He has to take various decisions in this respect. These decisions may include how much and what inventory to be maintained and whether and how much credit be given to customers etc.

Financing Decision

Financing decision is the second important function to be performed by the financial manager. Broadly, he or she must decide when, where from and how to acquire funds to meet the firm's investment needs. There are two main sources of finance for any firm, the shareholders funds and the borrowed funds. These sources have their own peculiar features and characteristics. The central issue before him or her is to determine the appropriate proportion of equity and debt. The mix of debt and equity is known as the firm's capital structure. The financial manager must strive to obtain the best financing mix or the optimum capital

structure for his or her firm. The capital structure is considered optimum when the market value of shares is maximized. In the absence of debt, the shareholders' return is equal to the firm's return. The use of debt affects the return and risk of shareholders, it may increase the return on equity funds, but it always in creases risk as well. The change in the shareholders' return caused by the change in the profits is called the financial leverage. The financial managers have to maintain a proper balance between return and risk.

Dividend decision

The third major decision which the financial manager has to take is dividend decision. The dividend decision should be analysed in relation to the financing decision of a firm. The financial manager must decide whether the firm should distribute all profits, or retain them, or distribute a portion and retain the balance. The proportion of profits distributed as dividends is called the dividend-payout ratio and the retained portion of profits is known as the retention ratio.

The final decision relating to dividend decision will depend upon the preference of the shareholders and investment opportunities available within the firm. When firm have investment opportunities, its better to retain the profit as they are the cost free and risk free source of finance. The second major aspect of the dividend decision is the factors determining dividend policy of a firm in practice.

Objectives of Financial Management

The objectives provide a framework for optimum financial decision making. The finance manager must have a well defined objectives in the light of which he has to take various decisions. A goal of the firm may be defined as a target against which the firm's operating performance can be measured. The objective specifies what the decision maker is trying to accomplish and, by doing so provides a frame work for analyzing different decision rules. In most cases, the objective may be stated in terms of maximizing some functions or variables like profit, size, value, social welfare etc or minimize some functions or variables (risk, cost etc.). In case of multiple objectives, however, the situation would be like serving several masters at a time and the decision maker may end up meeting none of these multiple objectives.

A clear understanding of the objectives of financial management is a perquisite, as the objectives provide a framework for optimum decision making. Objectives of financial management provide a selection criterion for the relevant decision fields.

Shareholders are the major stakeholder of the firm therefore; the maximization of shareholders wealth is usually taken as main objective of the firm. In addition, profit maximization is also considered as the objective of the firm.

Maximization of profits: Profit maximization is the implied objective of the firm. The profit is regarded as a yard stick for the economic efficiency of any firm. If all business firm of society are working towards profit maximization then the economic resources of society as a whole would have been most efficiently, economically and profitably used. The profit maximization by one firm and if targeted by all, will ensure the maximization of the welfare of society So, the profit maximization as objective of financial management will result in efficient allocation of resources not only from the point of view of the firm but, also for the society as such.

Various parties have stake in the firm. Though the stake of the shareholders is of prime relevance, yet the interest of other parties such lenders, creditors, society etc. can not be ignored. The finance manager has to face a tough task of reconciling the interest of all these parties. The profit maximization overlooks the interest of other parties than the shareholders.

It is also argued that profit maximisation, as a business objective developed in the early 19th century when the characteristic features of the business structure were self-financing, private property and single entrepreneurship. The only aim of the single owner then was to enhance his or her individual wealth and personal power, which could easily be satisfied by the profit maximisation objective. The modern business environment is characterised by limited liability and a divorce between management and ownership. Shareholders and lenders today finance the business firm but it is controlled and directed by professional management.

The other important stakeholders of the firm are customers, employees, government and society. In practice, the objectives of these stakeholders or constituents of a firm differ and may conflict with each other. The manager of the firm has the difficult task of reconciling and balancing these conflicting objectives. In the new business environment, profit maximisation is regarded as unrealistic, difficult, inappropriate and immoral.

Objections to Profit Maximization

1. When the firm undertakes profit maximization as objective, it ignores the risk. In other words, the management undertakes all profitable investment opportunities regardless of associated risk.
2. The profit maximization concentrates on the profitability only and ignores the financial aspect of that decision and the risk associated with that financing. For example, in order finance a profitable investment, a firm may even borrow beyond capacity.
3. It ignores the timings of costs and returns and thereby, ignores the time value of money.
4. The profit maximization as an objective is vague and ambiguous. Profit refers to short term profit or long term profit; after tax profit or profit before tax etc is not clear.

A variant of the objective of profit maximization is often suggested as the maximization of the return on investment. The firm would undertake all those investment opportunities which have the percentage return in excess of percentage cost of funds. But, in this case also, the financial decisions will be directed in same way as profit maximization. So, profit maximization criterion is inappropriate and unsuitable as an operational objective of financial management. The alternative to profit maximization is wealth maximization of shareholders wealth.

Liquidity

Liquidity is also sometimes the objective of financial management. Liquidity and profitability are very closely related, when one increases, the other decreases. Apparently liquidity and profitability goals conflict in most of the decisions which the finance manager takes. For example, if higher inventories are kept in anticipation of increase in price of raw materials, profitability goal is approached but the liquidity of

the firm is endangered. Similarly, the firm by following a liberal credit policy may be in a position to push up its sales but its liquidity will decrease.

There is also a direct relationship between higher risk and higher return. Higher risk on the one hand endangers the liquidity of the firm; higher return on the other hand increases its profitability. A company may increase its profitability by having a very high debt-equity ratio. However, when the company raises funds from outside sources, it is committed to make the payment of interest, etc., at fixed time and in fixed amounts and hence to that extent its liquidity is reduced.

Wealth Maximization

Wealth maximization is also known as value maximization or net present wealth maximization. Value maximization is universally accepted as operational decision criteria for financial management as it remove the technical limitations of profit maximization. The measure of wealth which is used in financial management is the concept of economic value. The economic value is defined as the present value of the future cash flows generated by a decision, discounted at appropriate rate of discount which reflects the degree of associated risk. Higher discount rate is the result of higher risk and longer time period. This measure of economic value is based on cash flows rather than profit. The economic value concept is objective in its approach and also takes into account the timing of cash flows and the level of risk through the discounting process.The shareholders wealth is represented by the present value of all the future cash flows in the form of dividends or other benefits expected from the firm. The market price of share reflects this present value. Therefore, the economic value of the shareholders wealth is the market price of the share which is the present value of all future dividends and benefits expected from the firm.

Since, each shareholder's wealth at any time is equal to the market value of all his holdings in shares; an increase in the market price of firm's shares should increase the shareholder's wealth.

Therefore, maximization of shareholders wealth implies that the financial decisions will be taken in such a way that shareholders receive highest combination of dividends and the increase in market price of the share. The assumption in this approach is that shares are traded in efficient market where the effect of a decision is truly reflected price of share.

The goal of maximization of shareholders wealth makes the interest of the shareholders compatible with that of management. With this objective in sight, the management will allocate the available economic resources in the best possible way within the given constraints of risk. But, this objective is also not free from flaws. There are certain problems with the implementation of the goal of maximization of shareholders wealth ie the underlying assumption that market is efficient. The market price of a share is influenced by the overall economic and political scenario in the country. But, more often than not, the market price of a share may also fluctuate because of speculation activities. Still this objective is considered more viable, uncontroversial in comparison to profit maximization.

Social Responsibility

Another issue that deserves consideration is social responsibility: should businesses operate strictly in their stockholders' best interests, or are firms also responsible for the welfare of their employees, customers,

and the communities in which they operate? Certainly firms have an ethical responsibility to provide a safe working environment, to avoid polluting the air or water, and to produce safe products. However, socially responsible actions have costs, and not all businesses would voluntarily incur all such costs. If some firms act in a socially responsible manner while others do not, then the socially responsible firms will be at a disadvantage in attracting capital. To illustrate, suppose all firms in a given industry have close to "normal" profits and rates of return on investment, that is, close to the average for all firms and just sufficient to attract capital. If one company attempts to exercise social responsibility it will have to raise prices to cover the added costs. If other firms in its industry do not follow suit, their costs and prices will be lower.

The socially responsible firm will not be able to compete, and it will be forced to abandon its efforts. Thus, any voluntary socially responsible acts that raise costs will be difficult, if not impossible, in industries that are subject to keen competition.

Does all this mean that firms should not exercise social responsibility? No but, it does mean that most significant cost-increasing actions will have to be put on a mandatory rather than a voluntary basis to ensure that the burden falls uniformly on all businesses. Thus, such social benefit programs as fair hiring practices, minority training, product safety pollution abatement, and antitrust actions are most likely to be effective if realistic roles are established initially and then enforced by government agencies. Of course, it is critical that industry and government cooperate in establishing the rules of corporate behavior, and that the costs as well as the benefits of such actions be estimated accurately and then taken into account.

On the whole, the maximization of the shareholders wealth seems to be a normative goal towards which the firm should strive. A finance manager though operating with the objective of maximization of shareholders wealth need not undermine the importance of other goals. He must take decisions after weighing the relevant considerations.

Agency Problems: Managers versus Shareholders Goals

In large companies, there is a divorce between management and ownership. The decision-taking authority in a company lies in the hands of managers. Shareholders as owners of a company are the principals and managers are their agents. Thus, there is a principal-agent relationship between shareholders and managers. In theory, managers should act in the best interest of shareholders; that is, their actions and decisions should lead to SWM. In practice, managers may not necessarily act in the best interest of shareholders, and they may pursue their own personal goals. Managers may maximise their own wealth (in the form of high salaries and perks) at the cost of shareholders or may play safe and create satisfactory wealth for shareholders than the maximum. They may avoid taking high investment and financing risks that may otherwise be needed to maximize shareholders s' wealth. Such "satisfying" behaviour of managers will frustrate the objective of SWM as a normative guide. It is in the interests of managers that the firm survives over the long run. Managers also wish to enjoy independence and freedom from outside interference, control and monitoring. Thus, their actions are very likely to be directed towards the goals as of survival and self-sufficiency. Further, a company is a complex organisation consisting of multiple stakeholders such as employees, debt-holders, consumers, suppliers, government and society. Managers in practice may, thus, perceive their role as reconciling conflicting objectives of the stakeholders. This stakeholders' view of managers' role may comprise with the objective of SWM.

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

Basic Principles of Financial Management

Financial management principles are the basic foundations behind the decision made by financial managers. At the first instance, the finance function looks like a collection of unrelated decision rules. But, this is not true. In fact, decisions are based on some fundamental principles.

Principle 1 : The Risk-Return Trade-Off—we won't take on additional risk unless we expect to be compensated with additional return.

At some point, we have all saved some money. Why have we done this? The answer is simple: to expand our future consumption opportunities—for example, save for a house, a car, or retirement. Investors demand a minimum return for delaying consumption that must be greater than the anticipated rate of inflation. If they didn't receive enough to compensate for anticipated inflation, investors would purchase whatever goods they desired ahead of time or invest in assets that were subject to inflation and earn the rate of inflation on those assets. There isn't much incentive to postpone consumption if your savings are going to decline in terms of purchasing power.

Investment alternatives have different amounts of risk and expected returns. Investors sometime choose to put their money in risky investments because these investments offer higher expected returns. The more risk an investment has, the higher will be its expected return. Therefore, we won't take on additional risk unless we expect to be compensated with additional return.

Principle 2 : The Time Value of Money—A rupee received today is worth more than a rupee received in the future.

A fundamental concept in finance is that money has a time value associated with it: A rupee received today is worth more than a rupee received a year from now. Because we can earn interest on money received today, it is better to receive money earlier rather than later. In economics, this concept of the time value of money is referred to as the opportunity cost of passing up the earning potential of a rupee today.

In financial management our focus is on the creation and measurement of wealth. To measure wealth or value, we will use the concept of the time value of money to bring the future benefits and costs of a project back to the present. Then, if the benefits outweigh the costs, the project creates wealth and should be accepted; if the costs outweigh the benefits, the project does not create wealth and should be rejected. Without recognizing the existence of the value of money, it is impossible to evaluate projects with future benefits and costs in a meaningful way.

To bring future benefits and costs of a project back to the present we must assume a opportunity cost of money, or interest rate.

Principle 3 : Cash—Not Profits—Is King

In measuring wealth or value, we will use cash flows, not accounting profits, as our measurement tool. That is, we will be concerned with when the money hits our hands, when we can invest it and start earning interest on it, and when we can give it back to the shareholders in the form of dividends. Remember, it is the cash flows, not profits that are actually received by the firm and can be reinvested. Accounting profits, on the other hand, appear when they are earned rather than when the money is actually in hand. As a result, a firm's cash flows and accounting profits may not be the same.

Principle 4 : Efficient Capital Markets— The markets are quick and the prices are right.

Our goal as financial managers is the maximization of shareholder wealth. It is the value of the shares that the shareholders hold. In efficient markets stock price reflect all publicly available information regarding the value of the company. This means we can implement our goal of maximization of shareholder wealth by focusing on the effect each decision should have on the stock price if everything else were held constant. That is, over time good decisions will result in higher stock prices and bad ones, lower stock prices. Earnings manipulations through accounting changes will not result in price changes. Stock splits and other changes in accounting methods that do not feet cash flows are not reflected in prices. Market prices reflect expected cash flows available to shareholders.

Principle 5 : The Agency Problem—Managers won't work for owners unless it's in their best interest.

Although the goal of the firm is the maximization of shareholder wealth, in reality, the agency problem may interfere with the implementation of this goal. The agency problem results from the separation of management and the ownership of the firm. For example, a large firm may be run by professional managers who have little or no ownership in the firm. Because of this separation of the decision makers and owners, managers may make decisions that are not in line with the goal of maximization of shareholder wealth. They may approach work less energetically and attempt to benefit themselves in terms of salary and perquisites at the expense of shareholders.

Managers can be monitored by auditing financial statements managers' compensation packages. The interests of managers and shareholders aligned by establishing management stock options, bonuses, and perquisites directly tied to how closely their decisions coincide with the interest of shareholders. The agency problem will persist unless an incentive structure is set up that aligns the interest of managers and shareholders. In other words, what's good for shareholders must also be good for managers? If that is not the case, managers will make decisions in their best interests rather than maximizing shareholder wealth.

Principle 6 : All Risk Is Not Equal—Some risk can be diversified away, and some cannot

You are probably already familiar with the concept of diversification. There is an old saying: "don't put all of your eggs in one basket." Diversification allows good and bad events or observations to cancel each other out, thereby reducing total variability without affecting expected return.

Principle 7 : The objectives should be clear.

The last but, most important principle of financial management is clear information to all the managerial heads about organizational objectives. The objectives may vary but, the most important is the maximization of shareholders wealth. Time to time as per the requirement of organization the financial manager has to change his route for achieving that objective. For example if in any year the objective is liquidity, he has to maintain it by reducing credit.

TIME VALUE OF MONEY

To keep pace with the increasing competition, companies have to go in for new ideas implemented through new projects be it for expansion, diversification or modernization. A project is an activity that involves investing a sum of money now in anticipation of benefits spread over a period of time in the future. How do we determine whether the project is financially viable or not? Our immediate response to this question will be to sum up the benefits accruing over the future period and compare the total value of the benefits with the initial investment. If the aggregate value of the benefits exceeds the initial investment, the project is considered to be financially viable. While this approach prima facie appears to be satisfactory, we must be aware of an important assumption that underlies. We have assumed that irrespective of the time when money is invested or received, the value of money remains the same. Put differently, we have assumed that: value of one rupee now = value of one rupee at the end of year 1 = value of one rupee at the end of year 2 and so on. We know intuitively that this assumption is incorrect because money has time value. How do we define this time value of money and build it into the cash flows of a project?

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

Money has time value because of following reasons:

- Individual generally prefer current consumption over future consumption of goods and services though this preference may be subjective and differ from one person to another.
- Most individuals prefer present cash to future cash because of the available investment opportunities to which they can put present cash to earn additional cash. This opportunity to get return will not be available if the money is not invested now.
- The most important reason for time value of money is that future is not certain and therefore, he prefers current cash than cash in future.
- In inflationary conditions prices goes rise. As the price rise, the value of money goes down and the purchasing power of rupee is also going down.

There is a preference of having money at present than at a future point of time. This automatically means that a person will have to pay in future more for a rupee received today and a person may accept less for a rupee to be received in future.

The above statement relates to two different concepts:

1. Compound Value Concept

2. Present Value Concept

1. **Compound Value Concept :** In case of this concept, the interest earned on the initial principal becomes a part of principal at the end of the compounding period. For example, if Rs. 100 is invested at 10% compound interest for two years, the return for first year will be Rs 10 and for the second year interest will be received on Rs. 110 (i.e. 100 + 10). The total amount due at the end of second year will become Rs. 121 (i.e. 100 + 10 + 11). This can be understood better with the following illustration:

Example : Rs. 1,000 is invested at 10% compounded annually for three years. Calculate the compounded value after three years.

Solution: Amount at the end of 1st year will be:

$$1{,}000 + (1{,}000 \times 10) = \text{Rs } 1100$$

Amount at the end of 2nd year will be:

$$1100 + (1{,}100 \times 10) = \text{Rs } 1210$$

Amount at the end of 3rd year will be:

$$1{,}210 + (1{,}210 \times 10) = \text{Rs } 1331$$

The return from an investment is generally spread over a number of years. In the above illustration, the interest has been compounded only for three years. However, if interest is calculated for five-six-years, the method stated above would become tedious. The general equation used to calculate the compounded value after 'n' years is given below:

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

where A = Amount at the end of period n

P = Principal at the beginning of the period

i = Interest rate

n = Number of years.

The term $(1 + i)^n$ is the compound value factor (CVF) of a lump sum Re 1, and it always has a value greater than 1 for positive i, indicating that CVF increases as i and n increase. The compound value can be computed for any lump sum amount. Computation by this formula can also become very time consuming if the number of years become large, say 10, 15 or more. In such cases compound value tables can be used.

Compound Value of Rs. 1

Period	1%	25%	3%	4%	5%	6%	7%	8%	9%	10%	12%	14%	15%
1	1.010	1.020	1.30	1.040	1.050	1.060	1.070	1.080	1.090	1.100	1.120	1.140	1.150
2	1.020	1.040	1.062	1.082	1.102	1.124	1.145	1.166	1.188	1.210	1.254	1.300	1.322
3	1.030	1.061	1.93	1.125	1.158	1.121	1.225	1.263	1.295	1.331	1.404	1.482	1.521
4	1.041	1.082	1.126	1.170	1.216	1.262	1.311	1.360	1.412	1.464	1.574	1.689	1.749
5	1.051	1.104	1.159	1.217	1.276	1.338	1.403	1.469	1.530	1.611	1.762	1.925	2.011
6	1.062	1.126	1.194	1.265	1.340	1.419	1.501	1.587	1.677	1.772	1.974	2.195	2.313
7	1.072	1.149	1.230	1.316	1.407	1.504	1.606	1.714	1.828	1.949	2.211	2.502	2.560
8	1.183	1.172	1.267	1.369	1.477	1.594	1.718	1.851	1.993	2.144	2.476	2.853	3.518
9	1.094	1.125	1.305	1.423	1.551	1.689	1.388	1.999	2.172	2.358	2.773	3.252	3.518
10	1.105	1.219	1.334	1.480	1.629	1.791	1.967	2.159	2.367	2.94	3.106	3.707	4 046
11	1.116	1.243	1.384	1.539	1.710	1.898	2.105	2.332	2.580	2.853	3.479	4.226	4.652
12	1.127	1.268	1.426	1.601	1.796	2.012	2.52	2.518	2.813	3.138	3.896	4.818	5.350
13	1.138	1.294	1.469	1.665	1.886	2.133	2.410	2.720	3.066	3.452	3.363	4.492	6.153
14	1.149	1.319	1.513	1.732	1.980	2.261	2.579	2.937	3.342	3.797	4.887	6.261	7.076
15	1.61	1.346	1.558	1.801	2.079	2.397	2.759	3.172	3.642	4.177	5.474	7.138	8.137
16	1.173	1.373	1.605	1.873	2.183	2.540	2.952	3.426	3.970	4.595	6.130	8.137	9.358
17	1.184	1.400	1.653	1.948	2.92	2.693	3.159	3.700	4.328	5.054	6.866	9.276	10.761
18	1.196	1.428	1.702	2.026	2.407	2.854	3.380	3.396	4.717	5.560	7690	10.575	12.375
19	1.208	1.457	1.754	2.107	2.527	3.026	3.617	4.316	5.142	6.116	8.613	12.056	14.232
20	1.220	1.486	1.806	2.191	2.653	3.207	3.870	4.661	.604	6.728	9.646	13.743	16.637
25	1.282	1.641	2.0974	2.666	3.386	4.292	5.247	6.848	8.623	.0.835	17.000	26.426	32.919
30	1.348	1.811	2.427	3.243	4.322	5.743	7.612	10.063	13.268	17.449	29.960	50.960	66.212

Using the above table, for example, we get the same result.

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

$$A = 1000(1+.10)^3$$

The compound value of Rs 1 at 10% for 3 years period is 1.331.

$$A = 1000 \times 1.331 = 1331$$

Non annual compounding

Interest can be compounded more than once in a year. Saving institutions, particularly compound the interest semi annually, quarterly and even monthly basis. When the interest is compounded semi annually, means interest is paid twice a year. The interest rate will be half. In other words, there are two periods of six months. Similarly, in case of quarterly compounding interest rate will be ¼ th of annual rate and there are four quarters years. The formula for calculating the compound value is

$$A = P(1 + i/m)^{mxn}$$

where

A = Amount at the end of period

P = Principal at the beginning of the period

i = Interest rate

n = Number of years

m = number of times per year compounding is made.

Example : A deposit of Rs. 10,000 is made in a bank for a period of 3 year. The bank offers to receive interest 10% half-yearly. Calculate the compound value.

Solution :

$$A = P(1 + i/m)^{mxn}$$
$$A = 10000(1 + .10/2)^{2\times3}$$
$$A = 10000(1 + .5)^{6}$$
$$A = 10000 \times 1.340$$
$$A = 11340.$$

The compound value of Rs.1 at 5% interest for six years is 1.340 therefore, the compound value of 10000 after 3 years at 10% is 11340.

Compound Value for series of cash flow

Usually an investor invest money in installments and wish to know the value of his saving after a period of time, then the compound value for series of cash flow is calculated. For simplicity, we assume that the compounding time period is one year and payment is made at the end of each year.

Example: Mr. X deposits each year Rs 500, Rs 1,000. Rs 1,500. Rs 2,000 and Rs 2,500 in his saving bank account for 5 years. The interest rate is 5 per cent. He wishes to find the future value of his deposits at the end of the 5th year.

Solution :

End of year	*Amount deposited compounded*	*Number of years interest factor*	*Compounded*	*Future value*
1	Rs. 500	4	1.216	Rs. 608.00
2	1,000	3	1.158	1,158.00
3	1,500	2	1.103	1,654.50
4	2,000	1	1.050	2,100.00
5	2,500	0	1.000	2,500.00
				8,020.50

Future Value of an Annuity

Annuity is a fixed payment (or receipt) each year for a specified number of years. The formula for this is

$$Sn = A \times (Vi, n)$$

where

Sn = Compound amount of annuity

A = The value of one payment

Vi, n = The table value of annuity corresponding to rate of interest and number of years.

Let us illustrate the computation of the compound value of an annuity.

Example: A constant sum of Rs 100 is deposited in a savings account at the end of each year for four years at 5 per cent interest. Calculate the amount at the end of fourth year.

Solution: This implies that Rs 100 deposited at the end of the first year will grow for 3 years, Rs 100 at the end of second year for 2 years, Rs 100 at the end of the third year for 1 year and Rs 100 at the end of the fourth year will not yield an interest. Using the concept of the annuity, the compound value is

$$Sn = A \times (Vi, n)$$

$Sn = 100 \times$ (5% for four years)

$Sn = 100 \times 4.310^{*}$

* The value of Rs 1 as per the annuity table invested for four years at the rate of 5%

$Sn = 431.$

Compound Value of Rs. 1

Years	*1%*	*2%*	*3%*	*4%*	*5%*	*6%*	*7%*	*8%*	*9%*	*10%*
1	1.000	1.000	1.00	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2	2.010	2.20	1.030	1.040	2.050	2.060	2.070	2.080	2.90	2.100
3	3.030	3.60	3.91	3.122	3.152	3.184	3.215	3.246	3.278	3.10
4	4.060	4.122	4.184	4.26	4.310	4.375	4.440	4.506	5.573	4.641
5	5.101	5.204	5.309	4.546	4.526	5.637	5.751	5.867	5.958	6.105
6	6.152	6.308	6.468	6.633	6.802	6.975	7.153	7.336	7.523	7.716
7	7.214	7.434	7.662	7.898	8.142	8.394	8.654	8.923	9.200	9.487
8	8.286	8.53	8.892	9.214	9.549	9.897	10.260	10.637	11.028	11.436
9	9.368	9.755	10.159	10.583	11.027	11.491	11.978	12.488	13.021	13.579
10	10.462	10.50	11.464	12.006	12.578	13.181	13.816	14.487	15.193	15.937
11	11.567	12.169	12.808	13.486	14.207	14.972	15.784	16.645	17.560	18.531
12	12.682	13.412	14.192	15.026	15.917	16.70	14.888	18.977	20.141	21.384
13	13.809	14.680	15.618	16.627	17.713	18.882	20.141	21.495	22.953	24.523
14	14.947	15.974	17.086	18.292	19.598	21.015	22.550	24.215	26.019	27.975
15	16.097	17.293	18.599	20.023	21.878	23.276	25.129	27.152	29.361	31.772
16	17258	18.639	20.157	21.824	12.657	25.372	27.8888	30.324	330.03	35.949
17	18.430	20.012	21.761	23.697	25.840	28.213	30.840	33.750	36.793	40.544
18	19.614	21.412	23.414	25.645	28.132	30.905	33.999	37.540	41.301	45.599
19.	20.811	22.84	25.117	27.671	30.539	33.760	37.379	41.446	460.18	51.158
20	22.019	24.297	26.870	29.778	33.066	36.785	40.995	45.762	51.169	57.274
21	23.239	25.783	28.676	31.969	35.719	39.992	44.865	50.422	56.764	64.022
22	24.471	27.299	30.536	34.248	38.505	43.392	49.005	55.456	62.872	71.402
23	25.716	28.845	32.452	36.618	41.430	46.995	43.435	60.893	69.531	79.542
24	26.973	30.421	34.426	39.082	44.501	50815	258.176	66.764	76.789	88.496
25	28.243	32.030	36.459	41.645	47.726	54.864	63.248	73.105	84.699	98.346
30	34.786	0567	47.575	56.084	66.438	79.057	94.459	113.282	136.305	164.491

Present Value: Present Value or Discounting Technique

The concept of the present value is the exact opposite of that of compound value. While in the latter approach money invested now appreciates in value because compound interest is added, in the former approach (present value approach) money is received at some future date and will be worth less because the corresponding interest is lost during the period. In other words, the present value of a rupee that will be received in the future will be less than the value of a rupee in hand today. Thus, in contrast to the compounding approach where we convert present sums into future sums, in present value approach future sums are converted into present sums. Given a positive rate of interest, the present value of future rupees will always be lower. It is for this reason therefore, that the procedure of finding present values is commonly called discounting. It is concerned with determining the present value of a future amount, assuming that the decision maker has an opportunity to earn a certain return on his money. This return is designated in financial literature as the discount rate, the cost of capital or an opportunity cost. Since finding present value is simply the reverse of compounding, the formula for compounding of the sum can be readily transformed into a present value formula.

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

where

P = the present value for the future sum to be received or spent

A = the sum to be received or spent in future

i = interest rate

n = the number of years.

In order to simplify the present value calculations, tables are readily available fo. various ranges of i and n.

This can be easily understood with this example.

Example : Mr. X has been given an opportunity to receive Rs 1,060 one year from now. He knows that he can earn 6 per cent interest on his investments. What amount will he be prepared to invest for this opportunity?

Solution : $$P = \frac{A}{(1+i)^n} = A\left[\frac{1}{(1+i)^n}\right]$$

$A = 1060$
$i = 6\%$
$n = 1$ year

$$P = \frac{1060}{(1+.06)}$$

$$P = \frac{1060}{1.06} = \text{Rs. } 1000$$

Example : Mr X wants to find the present value of Rs 2,000 to be received 5 years from now, assuming 10 per cent rate of interest.

Solution :

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

Or $$P = A\,(\text{PVIF})$$

PVIF = Present value interest factor

PVIF as per Table for 5 years at 10% is 0.621.

Therefore, Present value = Rs 2.000 (0.621)

= Rs 1.242

Present Value of Re. 1

Years	*5%*	*6%*	*8%*	*10%*	*12%*	*14%*	*15%*	*16%*	*18%*	*20%*	*22%*	*24%*	*25%*	*28%*	*30%*
1	0.952	0.943	0.926	0.909	0.893	0.877	0.870	0.862	0.847	0.833	0.820	0.806	0.800	0.781	0.769
2	0.907	0.890	0.857	0.826	0.797	0.769	0.756	0.743	0 718	0.694	0.672	0.650	0.640	0.610	0.592
3	0.864	0.840	0.794	0.751	0.712	0.75	0.658	0.641	0.609	0.579	0.551	0.524	0.512	0.477	0.455
4	0.823	0.792	0.735	0.683	0.636	0.592	0.572	0.552	0.516	0.482	0.451	0.423	0.410	0.373	0.450
5	0.784	0.747	0.681	0.621	0.567	0.519	0.497	0.476	0.437	0.402	0.370	0.341	0.328	0.291	0.269
6	0.746	0.705	0.630	0.564	0.507	0.456	0.432	0.410	0.370	0.335	0.303	0.275	0262	0.227	0.207
7	0.711	0.665	0.583	0.513	0.452	0.400	0.376	0.354	0.314	0.279	0.249	0.222	0.210	0.178	0.159
8	0.647	0.627	0.570	0.467	0.404	0.351	0.327	0.305	0.266	0.233	0.204	0.179	0.168	0.139	0.123
9	0.645	0.592	0.500	0.424	0.361	0.308	0.284	0.263	0.225	0.193	0.167	0.144	0.134	0.108	0.094
10	0.614	0.558	0.463	0.386	0.322	0.270	0.247	0.227	0.191	0.162	0.137	0.116	0.107	0.085	0.073
11	0.585	0.527	0.429	0.350	0.287	0.237	0.215	0.195	0.162	0.135	0.112	0.094	0.087	0.066	0.056
12	0.557	0.497	0.397	0.319	0.257	0.208	0.187	0.168	0.137	0.112	0.092	0.076	0.069	0 052	0.043
13	0.530	0.469	0.368	0.290	0.229	0.182	0.163	0.145	0 116	0.093	0.075	0.061	0.055	0.040	0.033
14	0.505	0.442	0.340	0.263	0.205	0.160	0.141	0.125	0.099	0.078	0.062	0.049	0.044	0.032	0.025
15	0.481	0.417	0.315	0.239	0.183	0.140	0.123	0.108	0.084	0.065	0.051	0.040	0.035	0.025	0.020
16	0.458	0.394	0.292	0.218	0.163	0.123	0.107	0.093	0.071	0.054	0.042	0.032	0.028	0.019	0.015
17	0.436	0.371	0.270	0.198	0.147	0.108	0.093	0.080	0.060	0.045	0.034	0.026	0.023	0.015	0 012
18	0.416	0.350	0.250	0.180	0.130	0.095	0.081	0.069	0.051	0.038	0.028	0.021	0.018	0.012	0.009
19	0.396	0.331	0.232	0.164	0.0116	0.083	0.070	0.060	0.043	0.031	0.023	0.017	0.014	0.009	0.007
20	0.377	0.312	0.0215	0.149	0.104	0.073	0.061	0.051	0.037	0.026	0.019	0.014	0.012	0.007	0.005

Present Value of a Series of Cash Flows

In a business situation, it is very natural that returns received by a firm are spread over a number of

years. An investment made now may fetch returns for a period after some time. Any businessman will like to know whether it is worth to invest or forego a certain sum now, in anticipation of returns he will earn over a number of year(s). In order to take this decision he will need to equate the total anticipated future returns to the present sum he is going to sacrifice. To estimate the resent value of future series of returns, the present value of each expected inflows will be calculated. (In case of compounding, the expected future value of series of cash flows was calculated).

The present value of series of cash flows can be represented by the following formula:

$$P = \frac{A_1}{(1+i)^1} + \frac{A_2}{(1+i)^2} + \frac{A_2}{(1+i)} \cdots \frac{A_n}{(1+i)^n}$$

$$P = \sum_{i=1}^{n} \frac{A_1}{(1+i)}$$

P = Sum of individual present values of each cash flow

$A_1, A_2 A_3$ = Cash flows after period 1, 2, 3, etc.

i = Discounting rate.

Example : Find out the present value of future cash inflows given the time value money as 10% that will be received over next four years.

Year	*Cash Flows (Rs)*
1	1000
2	2000
3	3000
4	4000

Solution :

Year	*Cash flows (Rs.)*	*Present Value Factor*	*Present Value*
1	1000	.909	909
2	2000	.826	1652
3	3000	.751	2253
4	4000	.683	2732
	Present Value of series of cash flows		Rs. 7546

Present Value of an Annuity

In the above case there was a mixed stream of cash inflows. Annuity can be defined as a series of equal cash flows of an amount each time. Due to this nature of an annuity, a short cut is possible.

$$PVA_n = \frac{A_1}{(1+i)^1} + \frac{A_2}{(1+i)^2} + \ldots \frac{A_n}{(1+i)^n} = \left[\sum_{i=1}^{n} \frac{1}{(1+t)^n}\right]$$

where PVA = Present value of n annuity'

A = Value of single instalment

i = Rate of interest.

However, as stated earlier a more practical method of computing the present value would be to the annual instalment with the present value factor. The formula would then be as follows:

$$PVA = A \times ADF$$

where ADF denotes Annuity Discount Factor.

Example : Mr. X wishes to determine the present value of the annuity consisting of cash inflows of Rs 1,000 per year for 5 years. The rate of interest he can earn from his investment is 10 per cent.

Solution :

Present Value of an Annuity of Rs 1000

Year end (1)	*Cash flows (2)*	*PVF (3)*	*Present Value (4) (2) × (3)*
1	1000	.909	909
2	1000	.826	826
3	1000	.751	751
4	1000	.683	683
5	1000	.621	621
			3790

The Present Value of an Annuity of Rs 1000 for 5 years is 3790.

However, calculations can be greatly cut short as the present value factor for each year is to be multiplied by the annual amount of Rs 1,000. This method of calculating the present value of the annuity can also be expressed as an equation:

P = Rs 1,000 (0.909) + Rs 1,000 (0.826) + Rs 1,000 (OTS1) + Rs 1,000 (0.683 + Rs 1,000 (0.621) = Rs 3.790.

Simplifying the equation by taking out 1,000 as common factor outside the equation.

P = Rs 1,000 (0.909 + 0.826 + 0.751 + 0.683 + 0.621) = Rs 1 ` ` 790) = Rs 3.790

Thus, the present value of an annuity can be found by multiplying the annuity amount by the sum of the present value factors for each year of the life of the annuity. Such ready-made calculations are available in Table.

Present Value of Re. 1 Received Annually For *N* Years

Years	*5%*	*6%*	*8%*	*10%*	*12%*	*14%*	*15%*	*16%*	*18%*	*20%*	*22%*	*24%*	*25%*	*28%*	*30%*
1	0.952	0.943	0.926	0.909	0.893	0.877	0.870	0.862	0.847	0.833	0.820	0.806	0.800	0.781	0.769
2	1.859	0.1883	1.783	1.736	1.690	1.647	1.626	1.605	1.566	1.528	1.492	1.457	1.440	1.392	1.361
3	2.773	2.676	2.577	2.847	2.402	2.322	2.283	2.246	2.174	20.16	2.042	1.981	1.952	1.868	1.816
4	3.546	3.465	3.312	3.170	3.037	2.914	2.855	2.798	2.690	2.589	2.494	2.404	2.362	2.241	2.166
5	4.330	4.212	3.993	3.791	3.605	3.433	3.352	3.274	3.127	2.991	2.864	2.745	2.689	2.532	2.346
6	5.076	4.917	4.623	4.335	4.111	3.889	3.784	3.685	3.498	3.326	3.167	3.020	2.951	2.759	2.643
7	5.786	5.582	5.206	4.868	4.564	4.288	4.160	4.039	3.812	3.605	3.416	3.242	3.161	2.937	2.802
8	6.463	6.210	5.747	5.335	4.968	4.639	4.487	4.344	4.078	3.837	3.619	3.421	3.329	3.076	2.925
9	7.109	6.802	6.247	5.759	5.328	4.946	4.772	4.607	4.303	4.031	3.786	3.566	3.463	3.184	3.019
10	7.722	7.360	6.710	6.145	5.650	5.216	5.019	0.833	4.494	4.192	3.923	3.682	3.571	3.269	3.092
11	8.306	7.787	7.139	6.495	5.937	5.453	5.234	5.029	4.656	4.237	4.35	3.776	3.656	3.335	3.147
12	8.863	8.384	7.536	6.814	6.194	5.660	5.421	5.197	4.793	4.439	4.127	3.851	3.725	3.387	3.190
13	3.394	8.853	7.904	7.106	6.424	5.842	5.583	4.342	4.910	4.533	4.203	3.912	3.780	3.427	3.223
14	9.899	9.295	8.244	7.367	6.628	6.002	5.724	5.468	5.008	4.611	4.265	3.962	3.824	3.459	3.249
15	10.380	9.712	8.559	7.606	6.811	6.142	5.847	5.575	5.092	4.675	4.315	4.001	3.859	3.483	3.0268
16	10.383	10.106	8.851	7.824	6.974	6.265	5.954	5.669	5.162	4.730	4.357	4.033	3.887	3.503	3.283
17	11.274	10.477	9.122	8.022	7.120	6.373	6.047	5.749	5.222	4.775	4.391	4.059	3.910	3.518	3.295
18	11.690	10.828	9.372	8.201	7.250	6.467	6.128	5.818	5.273	4.812	4.419	4.080	3.928	3.529	3.304
19	12.082	11.158	9.614	8.365	7.366	6.550	6.188	5.877	5.316	4.844	4.442	4.097	3.942	3.539	3.311
20	12.462	11.470	9.818	5.514	7.469	6.623	6.25	5.929	5.355	4.870	4.460	4.110	3.954	3.546	3.316

Thus table presents the sum of present values for an annuity discount factor (ADF) of Rs 1 for wide ranges of interest rates, i, and number of years, n. From Table the sum ADF for five years at the rate of 10 per cent is found to be 3.791. Multiplying this factor by annuity amount (A) of Rs 1.000 in this example gives Rs 3,791. This answer is the same as the one obtained from the long method.

CONCEPT OF RISK AND RETURN

While making the decisions regarding investment and financing, the finance manager seeks to achieve the right balance between risk and return, in order to optimize the value of the firm. Return and risk go together in investments. Everything an investor (be it the firm or the investors in the firm) does is tied directly or indirectly to return and risk. Let us now examine these concepts of risk and return in greater detail.

Return

The objective of any investor is to maximize expected returns from his investments, subject to various constraints, primarily risk. Return is the motivating force, inspiring the investor in the form of

rewards, for undertaking the investment. The importance of returns in any investment decision can be traced to the following factors :

- It enables investors to compare alternative investments in terms of what they have to offer the investor.
- Measurement of historical (past) returns enables the investors to assess how well they have done.
- Measurement of historical returns also helps in estimation of future returns.

This reveals that there are two types of returns-Realized or Historical Return and Expected Return.

Realized Return

This is ex-post (after the fact) return, or return that was or could have been earned. For example, a deposit of Rs. 1,000 in a bank on January 1, at a stated annual interest rate of 10% will be worth Rs.1,100 exactly a year later. The historical or realized return in this case is 10%

Expected Return

This is the return from an asset that investors anticipate or expect to earn over some future period. The expected return is subject to uncertainty, or risk, and may or may not occur. The investor compensates for the uncertainty in returns and the timing of those returns by requiring an expected return that is sufficiently high to offset the risk or uncertainty.

The Components of Return

What constitutes the return on any investment? Return is basically made up of two components:

- The periodic cash receipts or income on the investment in the form of interest, dividends etc. The term yield is often used in connection with this component of return. Yield refers to the income derived from a security in relation to its price, usually its purchase price. For example, the yield on a 10% bond at a purchase price of Rs.900 is 11.11%.
- The appreciation (depreciation) in the price of the asset is referred to as capital gain (loss). This is the difference between the purchase price and the price at which the asset can be, or is, sold.

Many investors have capital gains as their primary objective and expect this component to be larger than the income component.

Measuring the Rate of Return

The rate of return is the total return the investor receives during the holding period (the period when the security is owned or held by the investor) stated as a percentage of the purchase price of the

investment at the beginning of the holding period. In other words, it is the income from the security in the form of cash flows and the difference in price of the security between the beginning and end of the holding period expressed as a percentage of the purchase price of the security at the beginning of the holding period.

The general equation for calculating the rate of return is shown below:

$$k = \frac{D_1 + (P_t - P_{t-1})}{P_{t=1}}$$

where k = Rate of return

P_t = Price of the security at time 't' i.e. at the end of the holding period.

P_{t-1} = Price of the security at time '$t-1$' i.e. at the beginning of the holding period or purchase price.

D_t = Income or cash flows receivable from the security at time't'.

rn are usually stated at an annual percentage rate to allow comparison of returns between securities. Let us first look at the calculation of the rates of return of an equity stock and then a bond.

A stock's rate of return

What are the two components of return from shares? The first component 'Dt' is the income in cash from dividends and the second component is the price change (appreciation and depreciation).

Example : 'f a share of C Ltd is purchased for Rs.3,580 on February 8 of last year, and sold for Rs.3,800 on February 9 of this year and the company paid a dividend of Rs.35 for the year, calculate the rate of return?

Solution : $$k = \frac{D_1 + (P_t - P_{t-1})}{P_{t=1}} = \frac{35 + (3,800 - 3,580)}{3,580} = 7.12\%$$

Rate of Return of a Bond (Debenture)

In the case of bonds, instead of dividends, the investor is entitled to payments of interest annually or semi-annually, based on the coupon rate. The investor also benefits if there is an appreciation in the price of the bond.

Example : If a 14%, Rs l, 000 ICICI debentures was purchased for Rs.l, 350 and the price of this security rises to Rs.1, 500 by the end of a year. Find the Rate of return for debenture.

Solution : $$k = \frac{14 + (1,500 - 1,350)}{1,350} = 2148\%$$

Risk

Risk and return go hand in hand in investments and finance. One cannot talk about returns without talking about risk, because, investment decisions always involve a trade-off between risk and return. Risk can be defined as the chance that the actual outcome from an investment will differ from the expected outcome. This means that, the more variable the possible outcomes that can occur (i.e., the broader the range of possible outcomes), the greater the risk.

Sources of Risk

Following are the some of the general sources of risk.

- ***Interest Rate Risk :*** Interest rate risk is the variability in a security's return resulting from changes in the level of interest rates. Other things being equal, security prices move inversely to interest rates. This risk affects bondholders more directly than equity investors.
- ***Market Risk :*** Market risk refers to the variability of returns due to fluctuations in the securities market. All securities are exposed to market risk but equity shares get the most affected. This risk includes a wide range of factors exogenous to securities themselves like depressions, wars, politics, etc.
- ***Inflation Risk :*** With rise in inflation there is reduction of purchasing power, hence this is also referred to as purchasing power risk and affects all securities. This risk is also directly related to interest rate risk, as interest rates go up with inflation.
- ***Business Risk :*** This refers to the risk of doing business in a particular industry or environment and it gets transferred to the investors who invest in the business or company.
- ***Financial Risk :*** Financial risk arises when companies resort to financial leverage or the use of debt financing. The more the company resorts to debt financing, the greater is the financial risk.
- ***Liquidity Risk :*** This risk is associated with the secondary market in which the particular security is traded. A security which can be bought or sold quickly without significant price concession is considered liquid. The greater the uncertainty about the time element and the price concession, the greater the liquidity risk. Securities which have ready markets like treasury bills have lesser liquidity risk.

Measurement of Risk

Risk is associated with the dispersion in the likely outcomes. Dispersion refers to variability. If an asset's return has no variability, it has no risk. An investor analyzing a series of returns on an investment over a period of years needs to know something about the variability of its returns or in other words the asset's total risk. There are different ways to measure variability of returns. The range of the returns, i.e. the difference between the highest possible rate of return and the lowest possible rate of return is one measure, but the range is based on only two, extreme values.

The variance of an asset's rate of return can be found as the sum of the squared deviation of each possible rate of return from the expected rate of return multiplied by the probability that the rate of return occurs.

$$VAR(k) = \sum_{i=1}^{n} P_i(k_i - \bar{K})^2$$

where $VAR(k)$ = Variance of returns

P_i = Probability associated with the 1 possible outcome

k_i = Rate of return from the th possible outcome

k = Expected rate of return

n = Number of years.

A third and most popular way of measuring variability of returns is standard deviation. The standard deviation denoted by is simply the square root of the variance of the rates of return explained above.

$$\sigma = \sqrt{VAR(k)} = \left[\sum_{i=1}^{n} P_i(k_i - \bar{K})^2\right]^{1/2}$$

The standard deviation and variance are conceptually equivalent quantative measures of total risk. Standard deviation is preferred to range because of the following advantages:

- Unlike the range, standard deviation considers every possible event and assigns each event a weight equal to its probability.
- Standard deviation is a very familiar concept and many calculators and computers are programmed to calculate it.
- Standard deviation is a measure of dispersion around the expected (or average) value. This is in absolute consensus with the definition of risk as "variability of returns".
- Standard deviation is obtained as the square root of the sum of squared differences multiplied by their probabilities. This facilitates comparison of risk as measured by standard deviation and expected returns as both are measured in the same costs. This is why standard deviation is preferred to variance as a measure of risk.

Suggested Readings

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7. M.Y. Khan and P.K. Jain, Financial Management, Text and Problems. Tata McGraw Hill, New Delhi.
8. R.P. Rastogi, Fundamentals of Financial Management. Galgotia, Publications, New Delhi.
9. V. K. Bhalla, Financial Management & Policy. Anmol Publications, Delhi.
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LESSON - 2

CAPITAL BUDGETING DECISIONS

—Manju Gupta

Every financial manager has to take three important decisions i.e. financing decision, investment decision and dividend decision. Investment decision is basically concerned with financing of current and fixed assets of the firm. Financing of current asset is known as working capital management decision while investment in fixed assets is known as capital budgeting decision.

The capital budgeting decisions are related to the allocation of investible funds to different long term assets. Broadly speaking, the capital budgeting decision denotes a decision where the lump sum funds are invested in the initial stages of a projects and the return are expected over a long period. The long term means more than a year or investments decision. Capital budgeting decisions are not only important for a manufacturing concern, but also to other types of organizations which have to take various decisions relating to finance from time to time.

In any growing concern, capital budgeting is more or less a continuous process carried out by different functional areas of management such as production, marketing etc. All the relevant functional departments play a crucial role in the capital budgeting decision process of any organization.

The role of a finance manager in the capital budgeting basically lies in the process of critical and in-depth analysis and evaluation of various alternative proposals and then to select one out of these. As already stated, the basic objective of financial management is to maximize the wealth of the shareholders, therefore the objective of capital budgeting is to select those long term investment projects that are expected to make maximum contribution to the wealth of the shareholders in the long run.

Features of Capital Budgeting

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

Capital budgeting decisions are compulsorily to be made in following cases:

(*i*) ***Replacements :*** Replacements of fixed assets may become necessary either on account of their being worn out or becoming outdated of account of new technology.

(*ii*) ***Expansion :*** A firm may have to expand its production capacity on account of high demand for its products and inadequate production capacity. This will need additional capital investment.

(*iii*) ***Diversification :*** A business may like to reduce its risk by operating in several markets rather than in a single market. In such an event capital investment may become necessary for purchase of new machinery and facilities to handle the new products.

(iv) ***Research and Development :*** Large sums of money may have to be expended for research and development in case of those industries where technology is rapidly changing. In case large sums of money are needed for equipment, these proposals will normally be included in the capital budget.

(v) ***Miscellaneous :*** A firm may have to invest money in projects which do not directly help in achieving profit oriented goals. For example, installation of pollution control equipment may by necessary account of legal requirements. Thus, funds will be required for such purposes also.

Significance of capital budgeting decisions

The capital budgeting decisions are often said to be the most important part of corporate financial management. Any decision that requires the use of financial resources is a capital budgeting decision, thus the capital budgeting decisions cover everything from broad strategic decisions at one say computerization of the office, at the other. The capital budgeting decisions affect the profitability of a firm for a long period therefore; the importance of these decisions is obvious. Even a single wrong decision by a firm may endanger the existence of the firm as a profitable firm decision to diversify into a new product line if not taken correctly, may convert a profitable firm into a loss making firm. There are several factors and considerations which make the capital budgeting decisions as the most important decisions of a finance manager. The relevance of capital budgeting may be stated as follows

(*a*) ***Long Term decisions :*** Perhaps, the most important features of a capital budgeting decision and which makes the capital budgeting so significant is that these decisions have long term effects on the risk and return composition of the firm. These decisions affect the future position of the firm to a considerable extent as the capital budgeting decisions have long term implications and consequences. By taking a capital budgeting decision, a finance manager in fact makes a commitment into the future, both by committing to the future needs of funds of the project and by committing to its future implications.

(*b*) ***Heavy investment Outlays :*** The capital budgeting decisions generally involve large commitment of funds and as a result substantial portion of capital funds are blocked in the capital budgeting decisions. In relative terms therefore, more attention is required for capital budgeting decisions, otherwise the firm may suffer from the heavy capital losses in time to come. It is possible that the return from a project may not be sufficient enough to justify capital budgeting decisions.

(*c*) ***Irreversible in nature :*** Most of the capital budgeting decisions are irreversible decisions. Once decided firm may not be in a position to revert back unless it is ready to absorb heavy losses which may result due to abandoning a project in midway. Therefore, the capital budgeting decisions should be taken only after considering and evaluating each and every detail of the project, otherwise the financial consequences may be far reaching.

(*d*) ***Complex decisions :*** Capital budgeting decisions are among the firm's most difficult decision as they are related to future and future assessment is difficult to predict. It is really a complex problem to correctly estimate the future cash flows of an investment. Economical environment forces causes uncertainty in cash floe estimates.

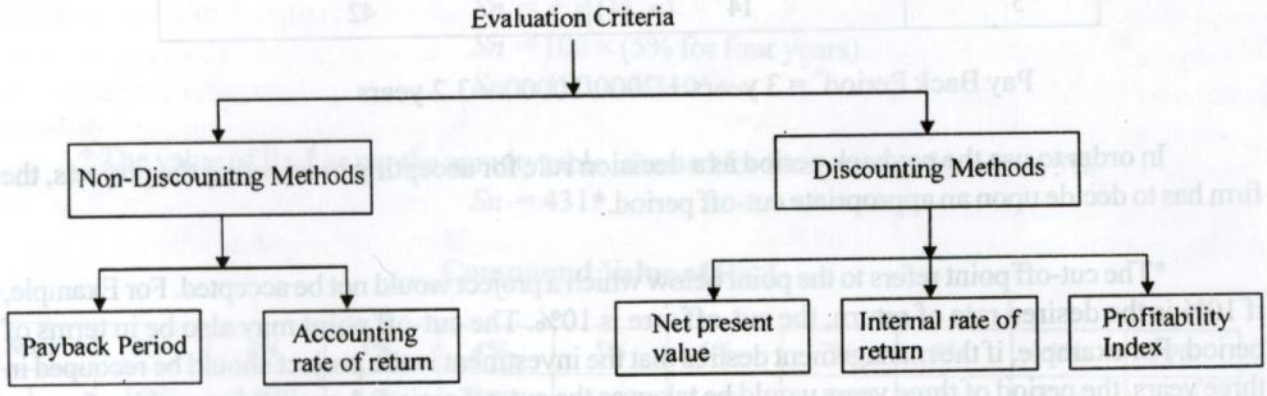
Capital Budgeting Process

The process of capital budgeting involves a number of steps that follow capital budgeting.

- ***Identification of organizational long-term goals :*** In the very beginning, the finance manager has to find out whether strategic or tactical investment will be more suitable for the firm from the viewpoint of its long-term goals. Entering a new product market involves strategic investment. Such proposals cannot be evaluated solely in terms of their impact on the cash flow. Intangible benefits that are in conformity with the firm's long-term goals should also be considered. On the contrary, tactical investments are those which primarily influence the firm's cash flow but do not necessarily change the character of the firm. Establishment of new facilities in an existing market for the purpose of manufacturing products related to the current product may be an example of a tactical investment proposal. Such investment proposals carry less risk as compared to the risk inherent in strategic proposals.
- ***Screening of Proposals :*** When the manager is satisfied that the proposal conforms to the long-term goals of the firm, he or she proceeds on to the second phase, that of screening the proposal. The second phase is one in which the manager determines the impact of the proposal on the firm. In large firms, it is the project analysis division that looks for new ideas and qualitatively evaluates their potential impact on the firm's revenues and cost. It examines whether the proposal would reduce cost and or expand revenue.
- ***Estimation of Costs and Benefits of a Proposal :*** The most important step required in the capital budgeting decision is to estimate the cost and benefit associated with all the proposals being considered. The cost of a proposal is generally the capital expenditure required to install a project or to implement a decision. However, the benefits of a proposal may be in the form of increased output, increased sales, reduction in labor cost, reduction in wastages etc. Every proposal is to be examined in the light of its cost and benefits.
- ***Estimation of the Required Rate of Return :*** The rate of return expected from a proposal is to be estimated in order to (*i*) adjust the future cost and benefit of a proposal for time value of money, and (*ii*) thereafter, determining the profitability of the proposal. This required rate return is also known as Cost of Capital.
- ***Using the capital budgeting decision criterion :*** A proper capital budgeting technique is to be applied to select the best alternative. So, in the first instance the technique itself is to be selected and then is to be applied for a better decision making.
- ***Project Implementation :*** In this phase, the firm makes the required arrangements to take up the new project. This includes arrangement of capital, training of personnel and other relevant works.
- ***Control :*** After the project is implemented, the firm monitors whether costs are incurred in accordance with the set standards. Minor deviations are managed, however, if deviations are very large, the project may be abandoned.
- ***Project Audit :*** When the project is complete, the extent of success or failure and the reasons thereof are carefully studied. In this way the audit phase provides valuable information to the firm.

Capital Budgeting Techniques

The main objective of capital fund investment is to obtain sufficient future economic return to deserve the original outlay i.e., sufficient cash receipts over the life of the project to justify the investment made. There are different techniques available for or non discounted and time adjusted or discounted cash flows.



The Payback Period

The payback period measures the length of time required to recover the initial outlay in the project.

$$\text{Pay back Period} = \frac{\text{Initial Investment}}{\text{Annual cash inflows}}$$

Example : If a project with a life of 5 years involves an initial outlay of Rs.20 lakh and is expected to generate a constant annual inflow of Rs. 8 lakh. Find the payback period of the project.

Solution : The payback period of the project is

$$\text{Pay back Period} = \frac{\text{Initial Investment}}{\text{Annual cash inflows}}$$

$$PB = \frac{20}{8} = 2.5 \text{ years.}$$

In case the cash flows are different

If the project is expected to generate different annual inflows of say Rs.4 lakh, Rs.6 lakh, Rs.8 lakh, Rs.10 lakh and Rs.14 lakh over the 5 years period the payback period will be find out by cumulating the cash flows.

Year	*Cash flows(lakhs)*	*Cumulative cash inflows*
1	4	4
2	6	10
3	8	18
4	10	28
5	14	42

Pay Back Period = 3 years + 2000/10000 = 3.2 years

In order to use the payback period as a decision rule for accepting or rejecting the projects, the firm has to decide upon an appropriate cut-off period.*

*The cut-off point refers to the point below which a project would not be accepted. For Example, if 10% is the desired rate of return, the cut-off rare is 10%. The cut-off point may also be in terms of period. For example, if the management desires that the investment in the project should be recouped in three years, the period of three years would be taken as the cut-off period. A project, incapable of generating necessary cash to pay for the initial investment in the project within three years, will not be accepted. Projects with payback periods less than or equal to the cut-off period will be accepted and others will be rejected.

The payback period is a widely used investment appraisal criterion for the following reasons:

- It is simple in both concept and application.
- It helps in weeding out risky projects by favoring only those projects which generate substantial inflows in earlier years.
- The emphasis in pay back is on the early recovery of investment. Thus, it gives insight into liquidity of the project. The funds so released can be put to other uses.
- Pay back period method also deals with risk. The project with a shorter pay back period will be less risky as compared to projects with a longer payback period, as the cash inflow which arises further will be less certain.

The payback period criterion however, suffers from the following shortcomings:

- It fails to consider the time value of money.
- The pay back period method ignores many of cash inflows which occur after the payback period.
- The cut-off period is chosen rather arbitrarily and applied uniformly for evaluating projects regardless of their life spans. Consequently, the firm may accept too many short-lived projects and too few long-lived ones.
- Since the application of the pay back criterion leads to discrimination against projects which generate substantial cash inflows in later years, the criterion cannot be considered as a measure of profitability.

Suitability of Payback Method : The use of payback period as a technique of evaluating capital budgeting proposals is suitable in following cases:

- During instability, the firm may have a primary consideration of recovering the initial cost at the earliest opportunity.
- When the firm has limited funds available and has no ability or willingness to raise additional funds. In such as case, the firm may wish to undertake those projects which ensure early liquidity/recovery to undertake some other projects.

Accounting Rate of Return or Average Rate of Return (ARR)

The ARR is based on the accounting concept of return on investment or rate of return. The ARR may be defined as the annualized net income earned on the average funds invested in a project. In other words, the annual returns of a project are expressed as a percentage of the net investment in the project.

$$\text{ARR} = \frac{\text{Average Annual Profit (after tax)}}{\text{Average investment in the project}}$$

This clearly shows that the ARR is a measure based on the accounting profits rather than the cash flows. It is very similar to the measure of rate of return on capital employed, which is generally used to measure the overall profitability of the firm.

In case the expected profits (after tax) generated by a project are equal for all the years than the annual profit itself is the average profit. So, this annual profit will be compared with the average investment.

$$\text{ARR} = \frac{\text{Annual Profit (after tax)}}{\text{Average investment in the project}}$$

If the project is expected to generate unequal profits or uneven stream of profits over different years, then the ARR may be calculated by finding out the average annual profits.

$$\text{ARR} = \frac{\text{Average Annual Profit (after tax)}}{\text{Average investment in the project}}$$

The average investment refers to the average quantum of funds that remains invested or blocked in the proposal over its economic life.

Example : A project will cost Rs 40000. Its stream of earnings before depreciation, interest and taxes (EBDIT) during first year through five years is expected to be Rs 10,000 Rs 12,000. Rs 14,000, Rs 16,000 and Rs 20,000. Assume a 50 per cent tax rate and depreciation on straight-line basis.

Solution :

Year	*EBDIT*	*EBT*	*PAT (50% tax)*
1	10000	2000	1000
2	12000	4000	2000
3	14000	6000	3000
4	16000	8000	4000

$$\text{Depreciation} = \frac{\text{Initial Investment}}{\text{Life of Project}}$$

$$\text{Depreciation} = \frac{40000}{5} = 8000$$

Total profit after tax is 16000

Average profit after tax = 16000/5=3200

$$\text{ARR} = \frac{\text{Average Annual Profit (after tax)}}{\text{Average investment in the project}}$$

$$\text{ARR} = \frac{3200}{20000} \times 100 = 16\%$$

To use it as an appraisal criterion, the ARR of a project is compared with the ARR of the firm as a whole or against some external yard-stick like the average rate of return for the industry as a whole. To illustrate the computation of ARR consider a project with the following data:

(Amount in Rs.)

Year	0	1	2	3
Investment	(90000)			
Sales Revenue		120000	100000	80000
Operating expenses		60000	50000	40000
Depreciation		30000	30000	30000
Annual Income		30000	20000	10000

$$\text{Average annual income} = \frac{30,000 + 20,000 + 10,000}{3} = 20,000$$

$$\text{Average net book value of investment} = \frac{90,000 + 0}{2} = 45000$$

$$\text{Accounting rate of return} = \frac{20,000}{(45,000)} \times 100 = 44 \text{ percent}$$

The firm will accept the project if its target average rate of return is lower than 44 percent.

Acceptance Rule

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

As an investment appraisal criterion, ARR has the following merits:

- Like payback criterion, ARR is simple both in concept and application. It appeals to business-men who find the concept of rate of return familiar and easy to work with rather than absolute quantities.
- It considers the returns over the entire life of the project and therefore, serves as a measure of profitability (unlike the payback period which is only a measure of capital recovery).
- The ARR can be readily calculated from the accounting data; unlike in the NPV and IRR methods, no adjustments are required to arrive at cash flow of the project.

This criterion, however, suffers from several serious defects:

First, this criterion ignores the time value of money. Put differently, it gives no allowance for the fact that immediate receipts are more valuable than the distant flows and results giving too much weight to the more distant flows.

Second, the ARR depends on accounting income and not on the cash flows. Since cash flows and accounting income are often different and investment appraisal emphasizes cash flows, a profitability measure based on accounting income cannot be used as a reliable investment appraisal criterion.

Finally, the firm using ARR as an appraisal criterion must decide on a yard-stick for judging a project and this decision is often arbitrary Often firms use their current book-return as the yard-stick for comparison. In such cases if the current book return of a firm tends to be unusually high or low, then the firm can end up rejecting good projects or accepting bad projects.

To conclude, the traditional methods of appraising capital investment decisions, the major drawbacks are (1) they do not consider the total benefits in terms of the magnitude and (2) the timing of cash flows. The time adjusted techniques satisfy these requirements.

Discounted Cash flow Techniques (DCF)

The distinguishing characteristic of the DCF capital budgeting techniques is that they take into consideration the time value of money while evaluating the costs and benefits of a project. In one form or

another, all these methods require cash flows to be discounted at a certain rate, that is, the cost of capital. The cost of capital (k) is the minimum discount rate earned on a project that leaves the market value unchanged. The second commendable feature of these techniques is that they take into account all benefits and the costs occurring during the entire life of the project. The first method under this technique is NPV.

Net Present Value (NPV)

The net present value is equal to the present value of future cash flows and any immediate cash outflow. In case of a project the immediate cash flow will be investment (cash outflow) and then net present value will be defined as the sum of the present values of cash inflows less initial investment.

$$\text{NPV} = \frac{CF_1}{(1+k)^1} + \frac{CF_2}{(1+k)^2} + \frac{CF_3}{(1+k)^3} + \frac{CF_n}{(1+k)^n} - C_o$$

where k = Discount rate

CF = Cash inflows at different time periods

C_0 = Cash outflow at 0 time period

n = Life of the project in years

Example : A company is considering a new project with initial outlays of Rs 12500. Forecasted annual income before charging depreciation but, after all other charges are as follows:

1st year	5100
2nd year	5100
3rd year	5100
4th year	7100

Calculate NPV at 12%.

Solution :

The net cash flows of the project and their present values are as follows:

Yea	1	2	3	4
Net cash flow (Rs)	5100	5100	5100	7100
PVIF @ k = 12%	0.893	0.797	0.712	0.636
Present value (Rs.)	4554	4065	363	4516

Net present value = (4,554 + 4,065 + 3,631 + 4,516) – (12,500)

= Rs .(16766-12500) = Rs. 4, 266

The decision rule based on the NPV criterion is obvious. A project will be accepted if its NPV is positive and rejected if its NPV is negative. Rarely in real life situations, we encounter a project with NPV exactly equal to zero. If it happens, theoretically speaking, the decision-maker is supposed to be either indifferent in accepting or rejecting the project. But in practice, NPV in the neighborhood of zero calls for a close review of the projections made in respect of such parameters that are critical to the viability of the project because even minor adverse variations can affect the viability of viable projects.

As an investment appraisal criterion, NPV has the following merits:

- The NPV is a conceptually sound criterion of investment appraisal because it takes into account the time value of money.
- NPV considers the cash flow stream in its entirety. In other words, it considers the total benefits arising out of the proposal over its lifetime.
- Since net present value represents the contribution to the wealth of the shareholders, maximizing NPV is congruent with the objective of investment decision making viz., maximization of shareholders' wealth.
- A changing discount rate can be built into the NPV calculations by altering the denominator. This feature becomes important as this rate normally changes because the longer the time span, the lower is the value of money and the higher is the discount rate.
- This method is particularly useful for the selection of mutually exclusive projects.

This criterion, however, suffers from several serious defects:

The first problem in applying this criterion appears to be the difficulty in comprehending the concept per se. Most non-financial executives and businessmen find 'Return on Capital Employed' or 'Average Rate of Return' easy to interpret compared to absolute values like NPV.

The second, and a more serious problem associated with the present value method, involves the calculation of the required rate of return to discount the cash flows. The discount rate is the most important element used in the calculation of the present values because different discount rates will give different present values. The relative desirability of a proposal will change with a change in the discount rate.

Another shortcoming of the NPV is that it is an absolute measure. Prime facie between two projects, this method will favor the project which has highest present value. But it is likely that this project may also involve a larger initial outlay. Thus, in case of projects involving different outlays, the present value method may not give dependable results.

Finally, the present value method may also not give satisfactory results in the case of two projects having different effective lives. In general, the project with a shorter economic life would be preferable, other things being equal. A project which has a higher present value may also have larger economic life so that the funds will remain invested for a longer period, while the alternative proposal may have shorter life but smaller present value. In such situations, the present value method may not reflect the true worth of the alternative proposals.

Internal Rate of Return (IRR) Method

The second discounted cash flow (DCF) or time-adjusted method for appraising capital investment decisions is the internal rate of return (IRR) method. This technique is also known as yield on investment, marginal efficiency of capital. Like the present value method the IRR method also considers the time value of money by discounting the cash streams. The basis of the discount factor, however, is different in both cases. In the case of the net present value method, the discount rate is the required rate of return and being a predetermined rate, usually the cost of capital; its determinants are external to the proposal under consideration. The IRR, on other hand, is based on facts which are internal to the proposal. In other words, while arriving at the required rate of return for finding out present values the cash flows-inflows as well as outflows are not considered. But, the IRR depends entirely on the initial outlay and the cash proceeds of the project which is being evaluated for acceptance or rejection. It is, therefore appropriately referred to as internal rate of return.

The internal rate of return is usually the rate of return that a project earns. It is defined as the discount rate(r) which equates the aggregate present value of the net cash inflows with the aggregate present value of cash outflows of a project. In other words, it is that rate which gives the project NPV of zero.

IRR can be determined by solving the following equation for r:

$$C_0 = \frac{CF_1}{(1+r)^1} + \frac{CF_2}{(1+r)^2} + \frac{CF_3}{(1+r)^3} + \frac{CF_n}{(1+r)^n} + \frac{SV+WC}{(1+r)^n}$$

where r = Internal rate of return

CF = Cash inflows at different time periods

C_0 = Cash outflow at 0time period

SV = Salvage value

WC = Working capital adjustments

Example : A firm is evaluating a proposal costing Rs 100000 and having annual cash inflow of Rs 25000 occurring at the end of each of next six years. There is no salvage value. Compute IRR for the project.

Solution : The annual cash inflow is uniform at Rs 25000 for the six years. Hence, the pay back is 4 years for the project. The IRR is calculated

$$F = \frac{1}{C}$$

where F = Factor to be located

I = initial investment

C = Cash inflow per year

$$F = \text{Rs.}\frac{1,00,000}{25,000} = 4$$

This factor 4 should be located in present value annuity in the lines of 6 years. The discount percentage will be somewhere between 12% and 13%. This means that the IRR is more than 12 % but less than 13%.

In order to find out the exact IRR, the NPV of the project for both these rates are calculated.

At 12% NPV = (RS 25000 × PVAF*) – 100000

= (Rs 25000 × 4.111) – 100000

= (Rs102775 – 100000) = 2775

*The present annuity value of Rs 1 at 12% for 6 years is 4.111

At 13% NPV = (Rs 25000 × PVAF) – 100000

= (Rs 25000 × 3.998*) – 100000

= (Rs 99950 – 100000) = –50

**The present annuity value of Rs 1 at 13% for 6 years is 3.998.

$$\frac{\text{Difference in calculated present Value and required net cash outlays}}{\text{Difference in calculated Values}} \times \text{Difference in Rate}$$

$$\text{IRR} = 12\% + \frac{1,02,775 - 1,00,000}{1,02,775 - 99,950} \times 1\% = 12.98\%$$

Accept-Reject Decision

The use of the IRR, as a criterion to accept capital investment decision, involves a comparison of the actual IRR with the required rate of return also known as the cut off rate or hurdle rate. The project would quantify to be accepted if the IRR (r) exceeds the cut off rate (k). If the IRR and the required rate of return are equal, the firm is indifferent as to whether accept or reject the project.

IRR is a popular method of investment appraisal and has a number of merits like:

- It takes into account the time value of money.
- It considers the cash flow stream over the entire investment horizon.
- Like ARR, it makes sense to businessmen who prefer to think in terms of rate of return on capital employed.

This criterion however suffers from the following limitation

- It involves tedious calculations. It generally involves complicated computation problems.
- Secondly it produces multiple rates which can be confusing.
- Thirdly in evaluating mutually exclusive proposals, the project with the highest IRR would be picked up to the exclusion of all others. However, in practice it may not turn out to be the one which is the most profitable and consistent with the objectives of the firm, that is, maximization of the shareholders' wealth.
- Finally, under the IRR method, it is assumed that all intermediate cash flows are reinvested at the IRR.

Profitability Index

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

$$PI = \frac{PV \text{ of cash inflows}}{\text{Initial cash outlay}} = \frac{PV(C_1)}{C_0}$$

PV = Present Value

C_t = Cash inflows in t time period

C_0 = Initial cash outlays

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

Solution : The PV of cash inflows at 10 per cent discount rate is:

$$PV = \text{Rs } 40{,}000(PVF) + \text{Rs } 30{,}000(PVF) + \text{Rs } 50{,}000(PVF) + \text{Rs } 20{,}000(PVF)$$

$$= \text{Rs } 40{,}000 \times 0.909 + \text{Rs } 30{,}000 \times 0.826 + \text{Rs } 50{,}000 \times 0.751 + \text{Rs } 20{,}000 \times 0.68$$

NPV = Rs l 12,350- Rs l00, 000 = Rs12, 350

PV of cash flows = Rs 112,350

$$P_1 = \frac{\text{Rs. } 112,350}{\text{Rs. } 1,00,000} = 1.1235.$$

The project will be accepted as the *PI> 1.*

Acceptance Rule

The following are the PI acceptance rules:

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

The project with positive NPV will have PI greater than 1. PI less than one means that the project's NPV is negative.

Evaluation of PI Method

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

- It recognizes the time value of money.
- It is consistent with the shareholders value maximization principle. A project with PI greater than one will have positive NPV and if accepted, it will increase the share-holders' wealth.
- In the PI method, since the present value of cash inflows is divided by the initial cash outflows it is a relative measure of a project's profitability.

But there are two serious limitations inhibiting the use of this criterion.

First, it provides no means for aggregating several smaller projects into a package that can be compared with a large project.

Second; when the investment outlay is spread over more than one period, this criterion cannot be used.

Thirdly like NPV method PI also need calculation of cash flows and estimation of discount rate. In practice, the estimation of cash flows and discount rate is difficult to compute.

Suggested Readings

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4. Keown, Martin, Petty, Scott, Jr Financial Management Principles and Applications. Prentice Hall of India.
5. M.Y. Khan and P.K. Jain, Financial Management, Text and Problems. Tata McGraw Hill, New Delhi.
6. R.P. Rastogi, Fundamentals of Financial Management. Galgotia, Publications, New Delhi.
7. V. K. Bhalla, Financial Management & Policy. Anmol Publications, Delhi.
8. Prasanna Chandra, Financial Management -Theory and Practice, Tata McGraw Hill.

LESSON - 3

COST OF CAPITAL

—Manju Gupta

Introduction

In the preceding chapter we have discussed the importance of the firm's investment decisions. As we know, it is the firm's investment decisions which, more than any other type of decision, will affect its value. It is therefore important that, before being implemented, investment decisions are properly appraised. The cost of capital is a critical variable in the investment appraisal process.

The cost of capital is the discount rate which is applied to a potential investment's expected cash flows; it is a discount rate which allows for the time value of money and project risk.

To be considered acceptable, investment projects must expect to earn a rate of return at least equal to the firm's cost of capital.

If a project yields a positive net present value (NPV) when discounted at the firm's cost of capital it is considered a worthwhile investment: it is expected to increase the value of the firm and the wealth of its shareholders. In other words, projects with positive NPVs earn a rate of return greater than the cost of capital.

Evidently if the cost of capital number is wrong, then the results of the appraisal will be wrong and perhaps value-diminishing project will be undertaken. It is clearly important that before being used to evaluate investment projects the cost of capital figure is determined with care.

The cost of capital means overall cost of capital i.e. the weighted cost of different sources of finance. The cost of capital is an important figure, as it serves to connect firm's long-term financing decisions directly to its long-term investment decisions. and thus to the wealth of its shareholders. The firm's financing decisions will affect its cost of capital, which in turn will affect its investment decisions. If, for example, a firm finances an investment by raising long-term debt, the cost of the debt will impact on its overall cost of capital. Calculating the cost of individual sources of capital also enables a financial manager to compare their relative costs, for example the cost of debt versus equity.

A company's cost of capital is also of interest to other parties, such as shareholders, investors and if the company operates in a regulated industry (e.g. a public utility) to the industry regulators and consumers. Sharcholders and investors will wish to compare the returns a company is earning with its cost of capital. Similarly a regulator will be interested that a company is not earning excessive returns above its cost of capital, and perhaps exploiting consumers by virtue of its monopoly position.

The cost of capital figure, which is used as the firm's discount rate, is usually quoted as a single (normally percentage) figure, yet a firm usually derives its capital from a variety of sources. A firm's capital structure will usually comprise a mixture of debt and equity finance which has been acquired at different

times in the firm's history and each source of finance will have its relevant cost. Combining the respective cost of these sources of finance, at any point in time, will produce an overall composite cost of capital figure for the firm.

We should be clear at this stage, that in determining the cost of capital we are primarily focusing on the cost of the firm's long-term capital, such as long-term debt, ordinary and preference share capital, and retained earnings. This is the capital which the firm employs to finance its long-term investments, generally investments in its fixed assets.

Clearly to stay in business and maintain its value a firm must earn a rate of return which at least matches, but preferably exceeds, its cost of capital. If the rate of return earned equals the cost of capital, then, in theory (assuming the firm's risk characteristics remain unchanged) the value of the firm will be maintained. Conversely, if the rate of return earned is greater than the cost of capital then in theory (again assuming the firm's risk characteristics remain unchanged) the value of the firm will be increased. A firm which earns a rate of return which is less than its cost of capital will erode its market value and find it difficult to attract investors.

Thus, we can define the cost of capital as the minimum rate of return a firm is required to earn on its investments in order to satisfy investors and to maintain its market value, in other words, it is the investor's required rate of return.

The key question is: how is this rate of return determined? The essential purpose of this chapter is to answer this question.

How the cost of capital is determined

We can begin by briefly reviewing the sources of financing for the firm's long-term investment decisions. The firm's capital structure may be viewed as a pool of resources from which its investment projects are financed. Sometimes projects may be financed specifically from debt, such as long-term loans or debentures, or alternatively they may be financed by equity, perhaps in the form of a rights issue. On other occasions the exact source will be indeterminate as projects will be financed from the firm's overall pool of capital resources.

The cost of capital is traditionally viewed in terms of a weighted average cost of capital (WACC), which is a simple weighted average of the cost of the individual capital components (equity, including retained earnings, preference shares, and debt).

Before discussing the weighted average cost of capital we will need to examine how the cost of each individual source of capital is determined, but first we will briefly review some of the key factors which influence a firm's cost of capital.

Factors which influence a firm's cost of capital

A firm's cost of capital is influenced by a number of factors, some of which a firm's management is able to control (e.g. capital structure, investment and dividend policy) and some which it is not (e.g. interest rates, taxation rates and regulations). The main factors are as follows:

Investors' required returns

When conditions in the capital markets that affect investor returns change, for example the level of interest rates, then the firm's cost of capital will change. If the return required by investors increase (decrease), the firm's cost of capital will similarly increase (decrease).

Risk

In considering the effect of changes in risk on the firm's cost of capital we should distinguish between the firm's business risk and financial risk. Remember that business risk arises from the nature of the firm's business environment and the particular characteristics of the type of business or industry in which it operates. For example, the competitive structure of the industry, its sensitivity to changes in macroeconomic variables such as interest rates and inflation, and the stability of industrial relations all combine to determine a firm's business risk.

The level of business risk in some industries, for example catering and construction is higher than in others and is a variable which lies largely outside management's control.

Financial risk in contrast represents the risk which arises from a firm's level of gearing leverage and is a variable which is directly under management's control. Basically the more debt a firm introduces into its capital structure, the greater the level of financial risk or risk of the firm not being able to meet its financial obligations and the greater the return the equity shareholders will require to compensate for the additional financial risk.

Should a new investment project significantly alter a firm's risk profile, that is, its systematic risk, then it will also alter the firm's cost of capital. This may be because the new investment is much more risky than usual. For example, it may be in a different line business from the firm's normal activities, thus changing the character of the firm's business risk.

As implied by the capital asset pricing model, an increase in the firm's systematic risk (as measured by its beta) will increase required returns. Remember that the two main components of a firm's equity beta 3 are its level of business risk and financial risk.

Capital structure

By changing its capital structure a firm may change its cost of capital. For example, when a firm decides to invest in a capital project any new funds raised may alter the firms existing capital structure that is its mix of equity and debt financing, and therefore its average cost of capital. A significant increase in a firm's gearing by raising additional debt finance may cause equity shareholders to demand increased returns because of the increased exposure to financial risk.

It is not uncommon for a firm, or its financial manager, to operate with some form of optimal or target capital structure in mind.

Dividend policy

Change in dividend policy either by paying out significantly increased or reduced cash dividends to its shareholders, this maybe interpreted by the financial markets and investors as a signal of favourable or adverse changes in the firm's future prospects. This in turn could impact on the firm's market value, and thus on the returns required by investors.

Taxation

Changes in taxation may also affect the firm's overall cost of capital. For example, if the rate of corporation tax is increased the cost of debt capital will be reduced and vice versa. This is because the interest payable by the firm on debt capital is allowable as a tax deductible expense.

Computation of cost of capital

Now we are familiar with the different sources of long-term finance, let us find out what it costs the company to raise these various types of finance. The cost of capital to a company is the minimum rate of return that it must earn on its investments in order to satisfy the various categories of investors who have made investments in the form of shares, debentures or term loans. Unless the company earns this minimum rate, the investors will be tempted to pull out of the company, leave alone participate in any further capital investment in that company. For example, equity investors expect a minimum return as dividend on their perception of the risk undertaken based on the company's past performance, or on the returns they are getting from shares they have of other companies.

The weighted arithmetic average of the cost of different financial resources that a company uses is termed as its cost of capital. Let us look at a simple example. A company has a total capital base of Rs.500 lakh in the ratio of 1 : 1 of debt-equity i.e. divided equally between debt and equity; Rs.250 lakh of debt and Rs.250 lakh of equity. If the post-tax costs of debt and equity are 7% and 18% respectively, the cost of capital to the company will be equal to the weighted average cost i.e.,

$$= \frac{250}{500} \times 7\% + \frac{250}{500} \times 18\% = 12.5\%$$

For calculating the cost of capital of the firm, we have to first define the cost of various sources of finance used by it. The sources of finance that are typically tapped by a firm are (*a*) debentures (*b*) preference capital (*c*) equity capital, and (*d*) retained earnings. The mechanics involved in computing the costs of these sources of finance are discussed in the following section.

Cost of different sources of finance

Cost of Debentures

Debt may be issued at par, at premium or discount. It may perpetual or redeemable.

When debt is perpetual

(*a*) ***Debt is issued at par :*** The computation of cost of debt issued at is comparatively an easy task. It is the explicit interest rate adjusted further for the tax liability of the company. The tax is deducted out of the interest payable, because interest is treated as an expense while computing the firm's income for tax purposes. However, the tax adjusted rate of interest should be used only in those cases where the "earning of the firm before interest and tax" (EBIT) is equal to or exceed the interest. In case, EBIT is in negative, the cost of debt should be calculated before adjusting interest rate for tax. It may be computed according to the following formula:

$$K_d = (1 - T)\, R$$

where K_d = Cost of debt; T = Marginal tax rate:

R = Debenture interest.

Example : A company has issued 9% debentures and the tax rate is 50%, find the cost of debt.

Solution : The cost of debt will be as follows

$$K\backslash = (1 - .T)\, R$$

$$K_d = (1 - .5)9 = .5 \times 9 = 4.5\%$$

(*b*) ***Debt issued at premium or discount :*** In case the debentures are issued at premium or discount, the cost of debt should be calculated on the basis of net proceeds realized on account of issue of such debentures or bonds. Such cost may further be adjusted keeping in view the tax rate applicable to the company. Formula for that is

$$K_d = \frac{I(1-T)}{NP}$$

where K_d = Cost of debt after tax,

I = Annual interest payment,

NP = Net proceeds of loans or debentures,

T = Tax rate.

Example : A company issues 10% irredeemable debentures of Rs. 100000. T the-55% tax bracket. Calculate the cost of debt (before as well as after tax) if the debentures are issued at (*i*) par; (*ii*) 10% discount (*iii*) 10% premium.

Solution : Cost of debentures can be calculated according to the following

$$K_d = \frac{I(1-T)}{NP}$$

(*i*) Issued at par $K_d = \frac{10000(1-.55)}{100000} = 4.5\%$

(*ii*) Issued at discount

$$K_d = \frac{10000(1-.55)}{90000} = 5\%$$

(*iii*) Issued at 10% premium:

$$K_d = \frac{10000(1-.55)}{110000} = 4.1\%$$

Cost of redeemable debt : If the debentures are redeemable after the expiry of a fixed period the effective cost of debt before tax can be calculated by using the following formula:

$$K_d = \frac{1+(P-NP)n}{(P+NP)/2}$$

where I = Annual interest payment,

P = Redemption value of debentures,

NP = Net proceeds of debentures,

n = Number of years to maturity.

Example : A firm issues debentures of Rs. 1,00,000 and realizes Rs. 98,000 after allowing 2% commission to brokers. The debentures carry an interest rate of 10%. The debentures are due for maturity at the end of the 10th year. You are required to calculate the effective cost of debt before tax.

Solution : K_d(before tax) $= \frac{1+(P-NP)/n}{(P+NP)/2} = \frac{10,000+(1,00,000-98,000)/10}{(1,00,000+98,000)/2}$

$= .103$ or 10.30%.

In the above example, if the tax rate is 55%, the cost of debt after tax can be calculated as follows:

K_d(after tax) $= K_d$ (before tax) $\times (1-T)$

$= 10.30\ (1-55) = 10.30 \times .45 = 4.64\%$.

Example : Ajax Limited has recently made an issue of non-convertible debentures for Rs.400 lakh. The terms of the issue are as follows: each debenture has a face value of Rs.l00 and carries a rate of interest of 14 percent. The interest is payable annually and the debenture is redeemable at a premium of after 10 years.

If Ajax Limited realizes Rs.97 per debenture and the corporate tax rate is 50 percent, what is the cost of the debenture to the company?

Solution : Given I = Rs.14, t = 0.5, P = Rs.105, and n = 10 years. NP = Rs.97

$$K_d = \frac{1+(P-NP)/2}{(P+NP)/2}$$

I = Annual interest payment,

P = Redemption value of debentures,

NP = Net proceeds of debentures,

n = Number of years to maturity.

$$= \frac{14(1-0.5)+105-97/10}{(105+97)/2} = 7.7\%$$

In order to keep sufficient earnings available for equity shareholders for maintaining their present value, the company should see that it earns on the funds provided by raising loans at least equal to the effective interest rate payable on them. In case the firm earns less than the effective interest rate, earnings available for the equity shareholders will decrease. This would naturally affect adversely the market price of the company's equity shares.

It should be noted that while calculating the real cost of debt, not only the contractual interest rate but also certain other imputed costs of raising funds from debts should be considered. The more is the financing of funds from the debt the higher is the expectation of the equity shareholders on their capital because of increase in the risk factor. Moreover, with increase in the amount of borrowed funds, the interest rate is also likely to rise. Thus, the imputed cost of raising funds through borrowings includes the increase in the expectation of the equity shareholders from their capital employed in the business. If it had not been so, the management would have at all times liked to finance their requirements only by means of raising long-term debts.

Cost of Preference Capital

The measurement of the cost of preference capital poses some conceptual difficulty. In the case of debt, there is a binding obligation on the firm to pay interest and the interest constitutes the basis to calculate the cost of debt. However, in the case of preference capital, payment of dividends is not legally

binding on the firm and even if the dividends are paid, it is not a charge on earning rather it is a distribution or appropriation of earning to preference shareholders. One may, therefore, be tempted to conclude that the dividends on preference capital do not constitute cost. This is not true.

The cost of preference capital is a function of the dividend expected by investors. Preference capital is never issued with an intention not to pay dividends. Although it is not legally binding upon the firm to pay dividends on preference capital, yet it is generally paid when the firm makes sufficient profits. The failure to pay dividends, although does not cause bankruptcy, yet it can be a serious matter from the ordinary shareholders' point of view. The non payment of dividends on preference capital may result in voting rights and control to the preference shareholders. More than this the firm's credit standing may be damaged. The accumulation of preference dividend arrears may adversely affect the prospects of ordinary shareholders for receiving any dividend, because dividends on preference capital represent a prior claim of profits. As a consequence, the firm may find difficulty in raising funds by issuing preference or equity shares. Also, the market value of the equity shares can be adversely affected if dividends are not paid to the preference shareholders and, therefore to the equity shareholders. For these reasons, dividends capital should be paid regularly except when the firm does not make profits, or it is in a very tight cash position.

Valuation of Irredeemable Preference Share

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

where K_p = Cost of preference share capital

DP = Fixed preference dividend

NP = Net proceeds of preference share

Example : A company issues 10 per cent irredeemable preference shares. The face value per share is Rs 100, but the issue price is Rs 95. What is the cost of a preference share? What is the cost if the issue price is Rs 105?

Solution : Cost of a preference share as follows:

When issue price is Rs 95:

$$K_p = \frac{DP}{NP} = \frac{10}{95} = 0.1053 \quad \text{or} \quad 10.53\%$$

When issue price is Rs 105:

$$K_p = \frac{DP}{NP} = \frac{10}{105} = 0.0952 \quad \text{or } 9.52\%$$

Redeemable preference shares

Redeemable preference shares is that preference shares which are issued with finite maturity. A formula similar to the cost of redeemable debt can be used to compute the cost of redeemable preference shares can not be issued.

$$K_p = \frac{D_p + (P - NP)/n}{(P + NP)/2}$$

where K_p = Cost of preference share capital

D_p = Fixed preference dividend

NP = Net proceeds of preference share

P = Redemption value of preference shares

n = Number of years to maturity.

The cost of preference share is not adjusted for taxes because preference dividend is paid after the corporate taxes have been paid. Preference dividends do not save any taxes Thus, the cost of preference share is automatically computed on an after-tax basis. Since interest is tax deductible and preference dividend is not, the after-tax cost of preference is substantially higher than the after-tax cost of debt.

Example : The terms of the preference share issue made by Color-Dye-Chem are as follows:

Each preference share has a face value of Rs.100 and carries a dividend rate of 14 percent payable annually. The share is redeemable after 12 years at par. If the net amount realized per share is Rs.95, what is the cost of the preference capital?

Solution : Given that $D_p = 14$, $P = 100$, $NP = 95$ and $n = 12$

$$K_p = \frac{D_p + (P - NP)/n}{(P + NP)/2} = \frac{14(100 - 95)/12}{(100 + 95)/2} = .148 \quad \text{or} \quad 14.8\%$$

Cost of Equity Capital

Firms may raise equity capital internally by retaining earnings. Alternatively, they could distribute the entire earnings to equity shareholders and raise equity capital externally by issuing new shares. In both cases, shareholders are providing funds to the firms to finance their capital expenditures. Therefore, the equity shareholders' required rate of return would be the same whether they supply funds by purchasing new shares or by foregoing dividends, which could have been distributed to them. There is, however, a difference between retained earnings and issue of equity shares from the firm's point of view. The firm may

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have to issue new shares at a price lower than the current market price. Also, it may have to incur flotation costs. Thus, external equity will cost more to the firm than the internal equity.

It is sometimes argued that the equity capital is free of cost. The reason for such argument is that it is not legally binding for firms to pay dividends to ordinary shareholders. Further, unlike the interest rate or preference dividend rate, the equity dividend rate is not fixed. It is misleading to assume equity capital to be free of cost. As we have discussed earlier, equity capital involves an opportunity cost; ordinary shareholders supply funds to the firm in the expectation of dividends and capital gains commensurate with their risk of investment. The market value of the shares determined by the demand and supply forces in a well functioning capital market reflects the return required by ordinary shareholders. Thus, the shareholders' required rate of return, which equates the present value of the expected dividends with the market value of the share, is the cost of equity. The cost of external equity would, however, be more than the shareholders' required rate of return if the issue price were different from the market price of the share.

In practice, it is a difficult task to measure the cost of equity. The difficulty derives from two factors: First, it is very difficult to estimate the expected dividends. Second, the future earnings and dividends are expected to grow over time. Growth in dividends should be estimated and incorporated in the computation of the cost of equity. The estimation of growth is not an easy task.

The cost of external equity or new issue of equity shares are based on what the shareholders as a class expect from their investment in equity shares. This is a difficult proposition because shareholders as a class are difficult to predict. Different authorities have conveyed different explanations and approaches. The following are some of the approaches according to which the cost of equity capital can be calculated

1. Dividend price (DIP) approach

According to this approach, the investor arrives at the market price of an equity share by capitalising the set of expected dividend payments. Cost of equity capital has therefore been defined as "the discount rate that equates the present value of all expected future dividends per share with the net proceeds of the sale (or the current market price) of a share".

In other words, the cost of equity capital will be that rate of expected dividends which will maintain the present market price of equity shares. In this approach the cost of equity can be calculated with the help of following formula:

$$K_e = \frac{D}{NP}$$

K_e = Cost of equity capital:

D = Dividend per equity share:

NP = Net proceeds of an equity share.

This approach rightly emphasises the importance of dividends, but it ignores the fact that the retained earnings have also an impact on the market price of the equity shares. The approach therefore does not seem to be very logical.

Example : A company offers for public subscription equity shares of Rs. 10 each at a premium of 10%. The company pays 5% of the issue price as underwriting commission. The rate of dividend expected by the equity shareholders is 20%.

You are required to calculate the cost of equity capital.

Solution : The cost of new equity can be determined according to the following:

$$K_e = \frac{D}{NP}$$

K_e = Cost of equity capital:

D = Dividend per equity share:

NP = Net proceeds of an equity share.

$$K_e = \frac{2}{10.45^*} = 0.19 \text{ or } 19\%$$

$$NP^* = 11 - 0.55 = 10.45$$

Dividend Growth Model

The firm's external equity consists of funds raised externally through public or rights issues. The minimum rate of return, the equity shareholders require on funds supplied by them by purchasing new shares to prevent a decline in the existing market price of the equity share, is the cost of external equity. The firm can induce the existing or potential shareholders to purchase new shares when it promises to earn a rate of return equal to:

$$K_e = \frac{D}{NP} + g$$

Thus, the shareholders' required rate of return from retained earnings and external equity is the same. The cost of external equity is, however, greater than the cost of internal equity because the selling price of the new shares may be less than market price. In India, the new issues of ordinary shares are sold at a price less than the market price prevailing at the time of the announcement of the share issue.

Example : The market price per share of Mobile Glycols Limited is Rs.125. The dividend expected per share a year hence is Rs. 12 and the DPS is expected to grow at a constant rate of 8 percent per annum. What is the cost of the equity capital to the company?

Solution : The cost of equity capital (*ke*) will be:

$$K_e = \frac{D}{NP} + g$$

$$K_e = \frac{12}{125} + 0.08$$

$$K_e = 17.6\%$$

Cost of Internal Equity or Retained Earning: The Dividend-growth Model

A firm's internal equity consists of its retained earnings. The opportunity cost of the retained earnings is the rate of return foregone by equity shareholders. The shareholders generally expect dividend and capital gain from their investment. The required rate of return of shareholders can be determined from the dividend valuation model.

Normal growth : In case of normal growth the dividend- valuation model for a firm whose dividends are expected to grow at a constant rate of g is as follows:

$$P_0 = \frac{DIV_1}{ke - g}$$

where $DIV_1 = DIV_0 (1 + g)$

The above formula can be written as follows

$$ke = \frac{DIV_1}{P_o} + g$$

The cost of equity is, thus, equal to the expected dividend yield (DIV_1/P_0) plus capital gain rate as reflected by expected growth in dividends (g). The model is based on the following assumptions:

- The market price of the ordinary share, P_0 is a function of expected dividends.
- The dividend, DIV_1 is positive (i.e., $DIV_1 > 0$).
- The dividends grow at a constant growth rate g, and the growth rate is equal to the return on equity, ROE, times the retention ratio, b (i.e., $g = ROE \times b$).
- The dividend payout ratio $[(1 - b)]$ is constant.

The cost of retained earnings determined by the dividend- valuation model implies that if the firm would have distributed earnings to shareholders, they could have invested it in the shares of the firm or in the shares of other firms of similar risk at the market price (P_0) to earn a rate of return equal to ke Thus,

the firm should earn a return on retained funds equal to ke to ensure growth of dividends and share price. If a return less than ke is earned on retained earnings, the market price of the firm's share will fall. It may be emphasised again that the cost of retained earnings will be equal to the shareholders' required rate of return since no flotation costs are involved.

Example : The current market price of a company's share is Rs 90 and the expected dividend per share next year is Rs 4.50. If the dividends are expected to grow at a constant rate of 8 per cent, calculate the cost of internal cost of equity.

Solution: DIV

$$ke = \frac{DIV_1}{P_o} + g$$

$$k_e = \frac{4.50}{90} + 0.08 = 0.05 + 0.08 = 0.13 \text{ or } 13\%$$

If the company intends to retain earnings, it should at least earn a return of 13 per cent on retained earnings to keep the current market price unchanged.

Supernormal growth : When a firm passes through different phases of growth the dividends may also grow at different rates in the future. The growth rate may be very high for a few years and afterwards, it may become normal indefinitely in future. The dividend-valuation model can also be used to calculate the cost of equity under different growth assumptions. For example if the dividends are expected to grow at a super-normal

Growth rate, gs for n years and thereafter, at a normal rate of gn beginning in year n + 1, then the cost of equity can be determined by the following formula:

$$P_o = \sum_{t=1}^{n} \frac{DIV_o(1+g_s)^t}{(1+k_e)^t} + \frac{P_n}{(1+k_e)^n}$$

P_n is the discounted value of the dividend stream, beginning in the year $n+1$ and growing at a constant, perpetual rate g_n at the end of year n, and therefore it is equal to:

$$P_n = \frac{DIV_{n+1}}{k_e - g_n}$$

When we multiply P_n by $1/(1+ke)n$ we obtain the present value of P_n in year 0. By substituting the value of P_n in P_0

$$P_n = \sum_{t=1}^{n} \frac{DIV_o(1+g_s)^t}{(1+k_e)^t} + \frac{DIV_{n+1}}{k_e - g_n} \times \frac{1}{(1+k_e)^t}$$

Zero Growth: In addition to its use in constant and variable growth situation, the dividend valuation model can also be used to estimate the cost of equity of no-growth companies. The cost of a equity share on which a constant amount of dividend is expected perpetually is given as follows:

$$ke = \frac{DIV_1}{P_0}$$

The growth rate g will be zero if the firm does not retain any of its earning. The firm follows a policy of 100 per cent payout. Under such case, dividends will be equal to earnings,

$$ke = \frac{DIV_1}{P_0} = \frac{EPS}{P_0}$$

Cost of Equity and Capital Asset Pricing Model (CAPM)

The CAPM provides an alternative approach for the calculation of the cost equity. For the purpose of the study the cost of equity is calculated on the basis of Capital Asset Pricing Model (CAPM).This model holds that the firm's equity cost is the composition of the risk free rate of return for a stock plus premium presenting the volatility of share price.

Cost of Equity = Risk free rate + Specific Risk Premium

$$ke = Rf + \beta(Rm - Rf)$$

where ke = Cost of Equity

$\beta\ (Rm - Rf)$ = Specific Risk Premium

Rf = Risk free rate

Rm = Market Return

Risk free rate is a return on investment which is risk free in nature and where there should be no default risk. The Government securities of most countries are default free in nature.

Specific risk premium is the product of level of risk and compensation per unit of risk. More specifically, it refers to risk premium required by the investors to invest in a specific company. It is the multiple of equity risk premium of the company in which the investor want to invest their money as its beta (β). Equity risk premium is the excess return over and above risk free rate that the investors demand for holding risky security. It is calculated as the difference of market rate of return and risk free rate *(Rm–Rf)*.

Beta (β) is the risk free coefficient which measures the volatility of given scrip of a company with respect to volatility of the market. It is the measure of responsiveness of company's shares due to change in economic factors of the economy. It is calculated by comparing return on a share to return in the stock market. Mathematically, beta is the statistical measure of volatility.

The beta of the firm's share (/3) Beta (/3) is the systematic risk of an ordinary share in relation to the market.

Suppose the risk-free rate is 6 per cent, the market risk premium is 9 per cent and beta of *L & T*'s share is 1.54.The cost of equity for *L & T* is:

$$K = 0.06 + 0.09 \times 1.54$$

$$= 0.1986\ 20\%$$

Computation of overall cost of capital

The capital of the organization is mainly consists of debt, preference shares equity shares and retained earnings. The overall cost of capital is considered by looking the cost of all these sources. The term cost of capital means the overall composite cost of capital defined as weighted average of the cost of each specific type of fund. The use of weighted average and not the simple average is warranted by the fact that the proportions of various sources of funds in the capital structure of a firm are different. To be representative therefore, the overall cost of capital should take into account the relative proportions of different sources and hence the weighted average.

The computation of the overall cost of capital (represented symbolically by k0) involves the following steps:

- Assigning weights to specific costs.
- Multiplying the cost of each of the sources by the appropriate weights.
- Dividing the total weighted cost by the total weights.

The crucial part of the exercise is the decision regarding appropriate weights and the related aspects.

Assignment of Weights

Marginal weights: The use of marginal weights involves weighting the specific costs by the proportion of each type of fund to the total funds to be raised. The marginal weights represent the percentage share of different financing sources the firm intends to raise/employ.

The basis of assigning relative weights is, therefore, new/additional/incremental issue of funds and, hence marginal weights. In using marginal weights, we are concerned with the actual amounts of each type of finance used in raising additional funds to finance new projects by the company.

Historical Weights: The alternative to the use of marginal weights is to use historical weights. In this the relative proportions of the various sources to the existing capital structure are used to assign weights. In other words the basis of the weighting system is the funds already employed by the firm. The use of the historical weights is based on the assumption that the firm's existing capital structure is optimal and therefore,

should be maintained in the future. That is the firm should raise additional funds for financing investments in the same proportion as they are in the existing capital structure. In other words, the existing proportion of various sources of long-term funds will be followed whenever the firm raises additional long-term funds to finance new investment projects. For instance, if the present capital structure of firm has 30 per cent debts, 20 percent preference shares, 40 per cent equity capital and 10 per cent retained earnings, the company will be assumed to raise incremental funds in the same proportion as it has done in the past.

Book Value and Market Value Weights: The second aspect of assigning weights to various sources of finance in calculating the composite cost of capital relates to the choice between book value weights and market value weights. This problem will arise only in the case of historical weights.

In theory, the use of market value weights for calculating the cost of capital is more appealing than the use of book value weights because:

(*i*) market values of securities closely approximate the actual amount to be received from their sale: (*ii*) the costs of the specific sources of finance which constitute the capital structure of the firm are calculated using prevailing market prices. However, there are practical difficulties in its use as calculating the market value of securities may present difficulties, particularly the market values of retained earnings. Moreover, weights based on market values are likely to fluctuate widely. On the other hand, the merits of book value weights are operational in nature. For one thing, book values are readily available from the published records of the firm. Also, firms set their capital structure targets in terms of book values rather than market values. Finally, the analysis of capital structure in terms of debt-equity ratio is based on book value.

Example : A firm finances all its investments by 40 per cent debt and 60 per cent equity. The estimated required rate of return on equity is 20 per cent after-taxes and that of the debt is 8 per cent after-taxes. The firm is considering an investment proposal costing Rs 40,000 with an expected return that will last forever. What amount (in rupees) must the proposal yield per year so that the market price of the share does not change?

Solution : The minimum overall required rate of return is:

$$\text{Debt} = 0.40 \times 0.08 = 0.032$$

$$\text{Equity} = 0.60 \times 0.20 = 0.120$$

$$\text{Weighted average} = 0.152$$

Thus, the investment proposal must earn 0.152 x Rs 40,000 = Rs 6,080 per year.

Annual return	=	Rs 6,080
Less: interest 0.08 × 0.40 × Rs 40,000	=	1280
Return on equity		4800

After-tax rate of return on equity:

Rs 4,800 ÷ (0.60 × Rs 40,000)

Rs 4,800 ÷ Rs 24,000 = 0.20

Example : The Servex Company has the following capital structure on 30 June 2004:

Ordinary shares (200,000 shares)	4,000
10% Preference shares	1,000
14% Debentures	1000
	8,000

The share of the company sells for Rs 20. It is expected that company will pay next year a dividend of Rs 2 per share, which will grow at 7 per cent forever. Assume a 50 per cent tax rate.

You are required to:

(*a*) Compute a weighted average cost of capital based on the existing capital structure.

(*b*) Compute the new weighted average cost of capital if the company raises an additional Rs 2,000,000 debt by issuing 15 per cent debenture. This would result in increasing the expected dividend to Rs 3 and leave the growth rate unchanged, but the price of share will fall to Rs 15 per share.

(*c*) Compute the cost of capital if in (b) above growth rate increases to 10 per cent.

Solution:

	After-tax Cost	*Weights*	*Weighted Cost*
Ordinary	.17	.50	.0850
10% Preference	.10	.125	.0125
14% Debenture	.07	.375	.0262
WACC			.1237

Cost of ordinary share is:

$$ke = \frac{DIV_1}{P_0} + g$$

$$ke = \frac{Rs.3}{Rs.15} + .07 = 0.10 + 0.07 = .17$$

(*b*) WACC : New capital structure

	Amount	*After-tax Cost*	*Weights*	*Weighted Cost*
Ordinary	4000	.27	.40	.108
10% Preference	1000	.10	.10	.010
14% Debenture	3000	.07	.30	.021
15% Debenture	2000	.075	.20	.015
WACC				.154

Cost of ordinary share is:

$$ke = \frac{DIV_1}{P_0} + g$$

$$ke = \frac{\text{Rs.3}}{\text{Rs.15}} + .07 = 0.20 + 0.07 = .27$$

(*c*) WACC: Changed growth rate

	Amount	*After-tax Cost*	*Weights*	*Weighted Cost*
Ordinary	4000	.30	.40	.120
10% Preference	1000	.10	.10	.010
14% Debenture	3000	.07	.30	.021
15% Debenture	2000	.075	.20	.015
WACC				.166

$$ke = \frac{DIV_1}{P_0} + g$$

$$ke = \frac{\text{Rs.3}}{\text{Rs.15}} + .10 = 0.20 + 0.10 = .30$$

Suggested Readings

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5. R.P. Rastogi, Fundamentals of Financial Management. Galgotia, Publications, New Delhi.
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7. Prasanna Chandra, Financial Management -Theory and Practice, Tata McGraw Hill.

Lesson 4

Leverages

A firm deploys resources to generate revenues. The difference between revenue and the cost of utilization of resources provides income. Claims on these revenues are of two types. One type of charge is a fixed charge which needs to be incurred irrespective of the level of production, revenues, or cash flows. It is not dependent upon the revenue generation capacity. The other charge is not fixed and varies according to the levels of production and sales. The residual that is left after all the commitments are met is issued as equity claim.

There are two kinds of fixed charges on cash flows. One of them emanates from the cost structure of the products the firm sells, while the other comes from the financing structure the firm uses in the acquisition of the assets. Both of these fixed charges have a significant bearing on the earnings of the shareholders of the firm. The impact of these fixed charges on the earnings of the owners of the firm is referred to as leverage. Just as the lever is used to magnify the use of force, firms use these fixed charges to magnify the earnings of their owners.

Cost Structure

Normally, there are two types of cost: fixed and variable. Examples of fixed cost would be salaries to personnel, administrative overhead expenses, and depreciation. These are costs that have to be incurred regardless of the level of sales. Examples of variable cost would be the cost of raw materials, packing expenses, taxes and duties, incentives, and commission. The incidence of these costs is dependent upon the level of sales. These costs vary directly with the level of sales.

Apart from purely variable and fixed costs, there are some costs that are semi-variable in nature. Such costs include electricity expenses, traveling, etc., which are partly fixed and partly vary with the level of sales. However, for the purpose our study of leverage, we can assume only two kinds of costs fixed and variable. Strictly speaking, no cost can be called either fixed or variable in the true sense. Here, we are concerned with the predominant cost behaviour, which may be either fixed variable.

Financing Structure

The other fixed charge arises from the financing structure the firm uses to fund its operations. Earnings derived from use of assets have to be shared among the suppliers of capital. Assets can be created by—borrowing; raising capital from investors who are content with a fixed amount of income; taking the assets on hire or lease; or raising capital from investors who are willing to take home the remainder after satisfying everybody else's claim. The financing structure of the firm used for creation of assets can again be categorized into two classifications. The first kind involves fixed charges on earnings, regardless of the level of earnings, such as interest on borrowing, dividend on preference capital, lease rentals, etc. The other kind of financing comes from equity shareholders who share the remaining earnings, if any, left after satisfying the fixed claims.

Leverage is the employment of an asset / source of finance for which firm pays fixed cost / fixed returns. There are two types of leverages operating and financial. We will discuss in detail about these leverages.

Operating Leverage

Operating leverage results from the existence of fixed operating expenses in the firm's income stream. The operating costs of a firm fall into three categories: (i) fixed costs which may be defined as those which do not vary with sales volume; they are a function of time and are typically contractual; they must be paid regardless of the amount of revenues available; (ii) variable costs which vary directly with the sales volume: and (iii) semi-variable or semi-fixed costs are those which are partly fixed and partly variable. They are fixed over a certain range of sales volume and increase to higher levels for higher sales volumes. Since the last category of costs can be broken down into fixed and variable components, the costs of a firm, in operational terms, can be divided into (a) fixed, and (b) variable.

The operating leverage may be defined as the firm ability to use fixed operating costs to magnify the effects of changes in sales on its earnings before interest and taxes. Operating leverage occurs any time a firm has fixed costs that must be met regardless of volume. We employ assets with fixed cost in the hope that volume will produce revenues more than sufficient to cover all fixed and variable costs. In other words, with fixed costs, the percentage change in profit accompanying a change in volume is greater than the percentage change in volume. This occurrence is known as operating leverage.

Example 1

A firm sells products for Rs 100 per unit, has variable operating costs of Rs 50 per unit and fixed operating cost 50,000 per year. Show the various levels of EBIT that would result from sale of (i) 1,000 units (ii) 2000 units and (iii) 30000 units.

Solution: If sales level of 2,000 units is used as a base for comparison, the operating leverage is illustrated in Table 1

EBIT for Various Sales Levels

	Case 2	*Base*	*Case 1*
	– 50%		*+ 50%*
1. Sales in units	1,000	2,000	3,000
2. Sales revenue	Rs 1,00,000	Rs 2,00,000	Rs 3,00,000
3. *Less:* Variable operating cost	50,000	1,00,000	1,50,000
4. Contribution	50,000	1,00,000	1,50,000
5. *Less:* Fixed operating cost	50,000	50,000	50,000
6. EBIT	Zero	50,000	1,00,000
	–100%		+100%

From the results contained in Table 1 certain generalizations follow:

(i) Case 1: A 50 per cent increase in sales (from 2,000 to 3,000 units) results in a 100 per cent increase in EBIT (from Rs 50,000 to Rs 100000).

(ii) Case 2: A 50 per cent decrease in sales (from 2000 to 1000 units) results in a 100 per cent decrease in EBIT (from Rs 50000 to zero).

Example 2

A firm sells its products for Rs 50 per unit, has variable operating costs of Rs 30 per unit and fixed operating costs of Rs 5,000 per year. Its current level of sales is 300 units. Determine the degree of operating leverage.

What will happen to EBIT if sales change: (a) rise to 350 units and (b) decrease to 250 units?

Solution: The EBIT for various sales levels is computed in Table 2

EBIT at Various Sales Levels

	Case 2 *−16.7%*	*Base*	*Case 1* *+16.7%*
1. Sales in units	250	300	350
2. Sales revenue	Rs 12,500	Rs 15,000	Rs 17,500
3. *Less:* Variable cost	7,500	9,000	10,500
4. Contribution	5,000	6,000	7,000
5. *Less:* Fixed operating cost	5,000	5,000	5,000
6. EBIT	Zero	1,000	2,000
	−100%		+100%

Interpretation: In case 2 16.7 percent decrease in sales volume (from 300 units to 250 units) leads to 100 per cent decline in the EBIT (from Rs 1,000 to zero). On the other hand, a 16.7 per cent increase in the sales level in case I (from 300 units to 350 units) results in 100 per cent increase in EBIT (from Rs 1,000 to Rs 2000).

The two examples(Tables 1 and 2) clearly show that when a firm has fixed operating costs, an increase in sales volume results in a more than proportionate increase in EBIT. Similarly, decrease in the level of sales has an exactly opposite effect. This is operating leverage; the former being favourable leverage, while the latter is unfavourable. Leverage, thus, works in both directions.

Degree of Operating Leverage

Operating leverage can also be defined as change in earning before interest and taxes (EBIT) due to change in sales. If all the costs of the product are variable, the expected percentage change in the income before taxes will be equal to the percentage change in sales. To examine this, let us consider two firms, A and B with varying composition of fixed and variable costs. Assume that Firm A procures electric bulb assemblies at Rs 80 a piece and sells them at a price 25% higher than the purchase price. It has no other cost of any kind. The income of the firm shall be Rs 20 from a sale of Rs 100. This profit of 20% of sales will remain constant, i.e., if the firm doubles its sales, the income will also double. The percentage change in earnings will be equivalent to the percentage change in sales. In other words, a 1% change in sales will result in a 1% change in earnings.

Now, consider Firm B, identical to Firm A in all respects except the cost structure. It has also got the same sales and earnings as Firm A, but is able to get the electric bulb assembly at 70% of the sale price, i.e., Rs 70 per piece, because it has hired sales professionals at fixed salaries to promote sales and attend to customer complaints. Assume that Firms A and B both have sales of Rs 100, with identical profits of Rs 20, as shown in Table 3

Let us consider the impact of changes in sales on earnings. If the revenue of Firm A doubles, the profit would double, too. However, for Firm B, the change in earnings would be more than double. In fact, it has gone up by 150% against a 100% rise in sales, as can be seen from Table 3.

(Rs)

	Firm A		Firm B	
	Present	Future	Present	Future
Sales	100	200	100	200
Variable cost	80	160	70	140
Fixed cost	—	—	10	10
Earnings before interest and taxes (EBIT)	20	40	20	50
% change in sales		100%		100%
% change in EBIT		100%		150%

It can be seen that the change in earnings of firm B is greater than the change in earnings of Firm A. Why has the change in earnings been more than proportionate in the case of Firm B? It is because Firm B has been able to use its sales professionals to achieve higher sales at a relatively lesser cost, i.e., Rs 70 rather than Rs 80 per bulb assembly, when compared with the operations of Firm A. In fact, Firm B hired sales professionals on fixed salaries precisely for that reason. Firm B has been able to use this fixed cost to its advantage.

The simple example of Firm A and Firm B highlighted how the fixed cost can be used to advantage. Similar situations often exist in the complex corporate.

Degree of operating leverage is more precise. The DOL measures in quantitative terms the extent or degree of operating leverage. When proportionate change in EBIT as a result of a given change in sales is more than the proportionate change in sales, operating leverage exists. The greater the DOL, the higher is the operating, leverage. Symbolically,

$$DOL = \frac{\text{Percentage change in EBIT}}{\text{Percentage change in sales}} > 1$$

$$\text{Alternatively, } DOL = \frac{\Delta EBIT \div EBIT}{\Delta Q \div Q}$$

where Q is the sales quantity in units.

The Degree of operating leverage in example 1

$$DOL = \frac{+100\%}{+50\%} = 2 \text{ (Case 1)}, \quad \frac{-100\%}{-50\%} = 2 \text{ (Case 2)}$$

$$= \frac{\text{Rs } 1,00,000}{\text{Rs } 50,000} = 2$$

The Degree of operating leverage in example 2

$$DOL = \frac{+100\%}{+16.7\%} = 6 \text{ (Case 1)}, \quad \frac{-100\%}{-16.7\%} = 6 \text{ (Case 2)}$$

$$= \frac{Rs\,6,000}{Rs\,1,000} = 6$$

Since the DOL exceeds 1 in both the illustrations, operating leverage exists. However, the degree of operating leverage is higher (3 times) in the case of the firm in Example 2 as compared to the firm in Example 1, the respective quotients being 6 and 2. The quotients mean that for every 1 per cent change in sales, there will be 6 per cent (Examples 2) and 2 per cent (Example 1) change in EBIT in the direction the sales change.
However, operating leverage exists only when there are fixed operating costs. If there are no fixed operating costs, there will be no operating leverage.

Degree of operating leverage can be thought of as one of the measures of the business risk the firm faces. It measures the sensitivity of earnings to changes in sales. The environment in which the firm operates governs its sales. Factors that constitute the business environment include industry prospects, governmental controls, level of competition, technology, etc., and each firm operates within the limitations imposed by its environment.

The business environment determines business risks. Factors affecting demand, supply, price, substitutes, competition, and elasticity of demand and supply etc cause the operating profit of the firm to change.

Different firms see different levels of operating profit and its variability, given the same environment on which they can hardly exercise any influence. The variability of earnings with changes in any of the above factors would in turn be determined by the extent to which the cost structure is fixed. The firm with a higher proportion of fixed cost would see a relatively large change in its earnings, as compared to the firm with a lower proportion of fixed cost. The cost structure in terms of fixed and variable is a function of factors like industry, technology, and level of automation. Businesses such as steel, cement, and airlines need heavy investments and thus have high fixed cost proportions; therefore, they see wilder fluctuation in income, as compared to businesses such as retailing, textile which have a greater proportion of variable cost. Operating leverage, therefore, is a parameter that is predominantly not in the control of management, but awareness of its implications in management is handy.

The best way that management can hope to deploy the concept of operating leverage is in the selection of product technology. Different technologies to manufacture the same product have different cost structures. Managers can focus their attention on the cost structure associated with each technology and choose the one that suits their requirements for desired level of EBIT and acceptable levels of its variability. Once the choice is made, the managers can do little subsequently. Hence, operating leverage becomes a strategic issue rather than a tactical one.

Although there is very little managers can do to alter the DOL, a good knowledge of operating leverage is certainly desirable for examining the impact of changes in EBIT with changes in level of sales, to assess risk and plan better. Managers can make a fair estimate of the likelihood of reaching certain levels of sales that are consistent with the risk profiles assumed.

Financial Leverage

Financial leverage relates to the financing activities of a firm. The sources from which funds can be raised by a firm, from the point of view of the cost charges, can be categorized into (i) those which carry a fixed financial charge and (ii) those which do not involve any fixed charge. The sources of funds in the first category consist of various types of long-term debt, including bonds, debentures, and preference shares. Long-term debts carry a fixed rate of interest which is a contractual obligation for the firm. Although the dividend on preference shares is not a contractual obligation, it is a fixed charge and must be paid before anything is paid to the ordinary shareholders. The equity shareholders are entitled to the remainder of the operating profits of the firm after all the prior obligations are met. We assume in the subsequent discussions that all preference dividends are paid in order to ascertain the operating profits available for distribution to ordinary shareholders.

Financial leverage results from the presence of fixed financial charges in the firm's income stream. These fixed charges do not vary with the earnings before interest and taxes (EBIT) or operating profits. They are to be paid regardless of the amount of EBIT available to pay them,

After paying them, the operating profits (EBIT) belong to the ordinary shareholders. Financial leverage is concerned with the effects of changes in EBIT on the earnings available to equity holders. It is defined as the ability of a firm to use fixed financial charges to magnify the effects of changes in EBIT on the earnings per share. In other words, financial leverage involves the use of funds obtained at a fixed cost in the hope of increasing the return to the shareholders.

Financial leverage may be favourable or unfavourable depending upon whether the earnings made by the use of fixed interest or dividend bearing securities exceed the explicit fixed cost, the firm has to pay for the employment of such funds, or not. The leverage will be considered to be favourable so long the firm earns more on assets purchased with the funds than the fixed costs of their use. Unfavourable or negative leverage occurs when the firm does not earn as much as the funds cost.

Trading on equity and financial leverage

Financial leverage is also sometimes termed as "trading on equity". However, most of the authors on financial management are of the opinion that the term trading on equity should be used for the term financial leverage only when the financial leverage is favourable. The company resorts to trading on equity with the objective of giving the equity shareholders a high rate of return than the general rate of earning on capital employed in the company, to compensate them for the risk that they have to bear. For example, if a company borrows Rs. 100 at 8% interest per annum, and earns a return of 12%, the balance of Rs. 4 per annum after payment of interest will belong to the shareholders and thus they can be paid a higher rate of return than the general rate of earning of the company. But in case the company could earn a return of only 6% on Rs. 100 employed by it, the equity shareholders' loss would be Rs. 2 per annum. Thus, the financial leverage is a double-edged sword. It has the potentiality of increasing the return to equity shareholders, but at the same time creates additional risk for them. Mr. Waterman in his Essays on Business Finance has beautifully described the role of financial leverage in the following words: "This role of financial leverage suggests a lesson in Physics, and there might be some point to considering the rate of interest paid as the fulcrum used in applying forces through leverage. At least it suggests consideration of pertinent variables; the lower the interest rate, the greater will be the profit and less the chances of loss. The less the amount borrowed, the lower

will be the profit or loss; also greater the borrowing greater the risk of unprofitable leverage and greater the chances of gain".

The computation of financial leverage can be done according to the following methods:

(i) Where capital structure consists of equity shares and debt. In such a case, financial leverage can be calculated according to the following formula:

$$\text{Financial Leverage} = \frac{OP}{PBT}$$

where

OP = Operating Profit or Earning before Interest and Tax (EBIT)

PBT = Profit before tax but after interest.

Example 3

A company has a choice of the following three financial plans. You are required to calculate the financial leverage in each case and interpret it.

	X	Y	Z
Equity Capital	2000	1000	3000
Debt	2000	3000	1000
Operating Profit	400	400	400
Interest @ 10% on debt in all case			

Solution:

The financial leverage will be computed as follows in case of each of these financial plans:

	X	Y	Z
	Rs.	Rs.	Rs.
Operating Profit *(OP)*	400	400	400
Interest (10% on debt)	200	300	100
Profit before Tax *(PBT)*	200	100	300
Financial Leverage $(\frac{OP}{PBT})$	400	400	400
	200	100	300
	= 2	4	1.33

Financial leverage, as explained earlier, indicates the change that will take place in the taxable income as a result of change in the operating income. For example, taking Financial Plan X as the basis, if the operating profit decreases to Rs. 200, its impact on taxable income will be as follows

Operating profit (OP or EBIT)	Rs200
Less Interest	200
Profit before tax (PET)	Nil

Financial leverage in case of plan X is 2. It means every 1% change in operating profit will result in 2% change in the taxable profit. In the above case operating profit has decreased from Rs. 400 to Rs. 200 (ie., 50% decrease), as a result the taxable profit has decreased from Rs. 200 to zero (ie., 100% decrease).

Degree of Financial Leverage

Degree of financial leverage may be defined as the percentage change in taxable profit as a result of percentage change in "operating profit".

This may be put in the form of following equation:
Degree of financial leverage (DFL)

$$= \frac{\text{Percentage change in taxable income}}{\text{Percentage change in the operating income}}$$

For examples in the above case the degree of financial leverage will be '2' calculated as follows

$$\frac{100}{50} = 2.$$

It should be noted that financial leverage exists only when the quotient as per the above equation is more than one.

(ii) Where the capital structure consists of preference shares and equity shares: The formula for computation of financial leverage can also be applied to a financial plan having preference shares. Of course, the amount of preference dividends will have to be grossed up (as per the tax rate applicable to the company) and then deducted from the earnings before interest and tax.

Example 4

The capital structure of a company consists of the following securities.

10% Preference share capital	Rs. 1, 00,000
Equity share capital (Rs. 10 shares)	Rs 1, 00,000

The amount of operating profit is Rs. 60,000. The company is in 50% tax bracket.
You are required to calculate the financial leverage of the company.
What would be new financial leverage if the operating profit increases to Rs. 90,000 and interpret your results.

Solution:

COMPUTATION OF THE PRESENT FINANCIAL LEVERAGE

	Operating Profit *(OP or EBIT)*	Rs. 60,000
Less:	Preference Dividend (after grossing up)	20,000
	PBT	40,000

$$\text{Present Financial Leverage} = \frac{OP}{PBT} = \frac{60,000}{40,000} = 1.5$$

COMPUTATION OF NEW FINANCIAL LEVERAGE

	New Operating Profit	90,000
Less:	Preference Dividend (after grossing up)	20,000
	PBT	70,000

$$\text{New Financial Leverage} = \frac{OP}{PBT} = \frac{90,000}{70,000} = 1.286$$

The existing financial leverage is 1.5. It means 1% change in operating profit (OP or EBIT) will cause 1.5% change in taxable profit (PBT) in the same direction. For example, in the present

case operating profit has increased by 50% (i.e., from Rs. 60,000 to Rs. 90,000). This has resulted in 75% increase in the taxable profit (i.e., from Rs. 40,000 to Rs. 70,000).

(iii) Where the capital structure consists of equity shares, preference shares and debt: In such a case the financial leverage is calculated after deduction from operating profit both interest and preference dividend on a before tax basis.

Example 5

A company has the following capital structure:

Equity share capital	Rs 1, 00,000
10% Preference share capital	1,00,000
8% Debentures	1,25,000

The present EBIT is Rs. 50,000. Calculate the financial leverage assuming that company is in 50% tax bracket.

Solution:

Operating Profit		Rs. 50,000
Less: Interest on debentures	10,000	
Pref. dividend (pre-tax basis)	20,000	Rs. 30,000
Profit before tax		Rs. 20,000

$$\text{Financial Leverage} = \frac{OP}{PBT}$$

$$= \frac{50000}{20000}$$

$$= 2.5$$

Alternative Definition of Financial Leverage

One of the objectives of planning an appropriate capital structure is to maximize the return on equity shareholders' funds or maximize the earning per share (EPS). Some authorities have used the term "financial leverage" in the context that it defines the relationship between EBIT and EPS. According to Gitman, financial leverage is "the ability of a firm to use fixed financial charges to magnify the effects of changes in EBIT on the firm's earning per share". The financial leverage therefore indicates the percentage change in earning per share in relation to a percentage change in EBIT.

The degree of financial leverage as per the above definition can be calculated according to the following equation:

$$\text{Degree of Financial Leverage} = \frac{\text{Percentage change in EPS}}{\text{Percentage change in EBIT}}$$

Of course, there will be no financial leverage according to the above equation if the quotient does not exceed one.

Example 6

A company has the following capital structure:

10,000 Equity shares of Rs. 10 each	Rs. 1,00,000
2,000 10% Pref. shares of Rs. 100 each	2,00,000

2,000 10% Debentures of Rs. 100 each	2,00,000

Calculate the EPS for each of the following levels of EBIT: (i) Rs. 1, 00,000; (ii) Rs. 60,000 and (iii) Rs. 1, 40,000. The company is in 50% tax bracket. Calculate the financial leverage taking EBIT level under (i) base.

Solution:

Computation of Earning Per Share

	(i)	(ii)	(iii)
EBIT	100000	60000	140000
Less: Interest on Debentures	20000	20000	20000
PBT	80000	40000	120000
Less: Income Tax	40000	20000	60000
PAT	40000	20000	60000
Less: Preference Dividend	20000	20000	20000
Earning available to equity shareholders	20000	Nil	40000
EPS	2	Nil	4

The above table shows that

(a) In case (ii) the EBIT has increased by 40% (i.e., from Rs. 1,00,000 to Rs. 60,000 while the earning per share has decreased by 100% (from Rs. 2 per share to nil).

(b) In case (iii) the EBIT has increased by 40% (from Rs. 1,00,000 to R 1,40,000) as compared to case (i) while the earning per share has increased by 100% (from Rs. 2 to Rs. 4)

The degree of financial leverage can therefore be computed as follows

$$\frac{\text{Percentage change in EPS}}{\text{Percentage change in EBIT}}$$

Financial Leverage in between (i) and (ii) = 100/40 = 2.5

Financial Leverage in between (i) and (iii) = 100/40 = 2.5

The same result can be obtained by using the equation OP/PBT as shown below.

COMPUTATION OF FINANCIAL LEVERAGE

			(i)	(ii)	(iii)
	OP		Rs. 1,00,000	60,000	1,40,000
Less:	Interest	20,000			
	Preference dividend (grossed up)	40,000	60,000	60,000	60,000
	PBT		40,000	—	80,000

$$\text{Financial Leverage} = \frac{OP}{PBT} = \frac{1,00,000}{40,000} = 2.5$$

This means that with every 1% change in operating profit (OP) profit before tax (PBT) will change (in the same direction) by 2.5%. For examples in situation (ii) OP has decreased by 40%.

This has resulted in decrease of PBT by 100% (i.e., 40 x 2.5). In situation (iii) OP has increased by 40%. This has resulted in increase of PBT by 100 %(ie., 40 x 2.5).

Financial leverage helps considerably the finance manager while devising the capital structure of the company. A high financial leverage means high fixed financial costs and high financial risk. A finance manager must plan the capital structure in a way that the firm is in a position to meet its fixed financial costs. Increase in fixed financial costs requires necessary increase in EBIT level. In the event of failure to do so, the company may be technically forced into liquidation.

Composite Leverage

As explained in the preceeding pages operating leverage measure percentage change in operating profit due to percentage change in sales. It explains the degree of operating risk. Financial leverage measures percentage change in taxable profit (or EPS) on account of percentage change in operating profit (i.e., EBIT). Thus, it explains the degree of financial risk. Both these leverages are closely concerned with the firm's capacity to meet its fixed costs (both operating and financial). In case both the leverages are combined, the result obtained will disclose the effect of change in sales over change in taxable profit (or EPS).

Composite leverage, thus, expresses the relationship between revenue on account of sales (i.e., contribution or sales less variable cost) and the taxable income. It helps in finding out the resulting percentage change in taxable income on account of percentage change in sales. This can be computed as follows:

Composite leverage = Operative leverage x Financial leverage

$$= \frac{C}{OP} \times \frac{OP}{PBT} = \frac{C}{PBT}$$

where

C = Contribution (sales - variable cost)

OP = Operating Profit or Earning before Interest and Tax

PBT = Profit before Tax but after Interest.

The computation of the composite leverage can be explained with the help of the following example.

Example 7

A company has sales of Rs. 1 lakh. The variable costs are 40 % of the sales while the fixed operating costs amount to Rs. 30,000. The amount of interest on long-term debt is Rs. 10,000. You are required to calculate the composite leverage and illustrate its impact if sales increase by 5%.

Solution:

STATEMENT SHOWING COMPUTATION OF COMPOSITE LEVERAGE

	Sales	Rs. 1,00,000
Less:	Variable costs (40% of sales)	40,000
	Contribution*(C)*	60,000
Less:	Fixed operating costs	30,000
	Earning before interest and tax *(EBIT)* or Operating profit *(OP)*	30,000
Less:	Interest	10,000
	Taxable Income *(PBT)*	20,000

$$\text{Composite leverage} = \frac{C}{PBT}$$

$$= \frac{60,000}{20,000} = 3$$

The composite leverage of 3' indicates that with every increase of Re. 1 in sales, the taxable income will increase by Rs. 3 (i.e; 1 x 3).

This can be verified by the following computations when the sales increase by 5%

Sales	Rs.1,05,000
Less: Variable costs	42000
Contribution(C)	63,000
Less: Fixed Operating Cost	30000
EBIT	33000
Less: Interest	10000
Taxable Income	23000

It is clear from the above computation that on account of increase in sales by 5% in profits before tax has increased by 15%. This can be verified as follows:

$$\text{Increase in \% Profits} = \frac{\text{Increase in Profits}}{\text{Base Profit}}$$

$$\frac{3000}{20000}$$

$$= .15 \text{ or } 15\%$$

The operating leverage and the financial leverage are the two quantitative tools used by the financial experts to measure the return to the owners (viz. earning per share) and the market price of the equity shares. The financial leverage is considered to be superior of these two tools. Since it focuses the attention on the market price of the share which the management always tries to increase by increasing the net worth of the firm. The management for this purpose resorts to trading on equity because when there is increase in EBIT then there is corresponding increase in the price of the equity shares. However, a firm cannot go indefinitely in raising the debt content in the total capital structure of the company.

If a firm goes on employing greater proportion of debt capital, the marginal cost of debt will also go on increasing because the subsequent lenders will demand higher rate of interest. The company's inability to offer sufficient assets and security will also stand in the way of further employment of debt capital. Moreover, a firm with widely fluctuating income cannot afford to employ a high degree of financial leverage.

A company should try to have a balance of the two 'leverages' because they have got tremendous acceleration or deceleration effect on EBIT and EPS. It may be noted that a right

combination of these leverages is a very big challenge for the management. A proper combination of both operating and financial leverages is a blessing for the firm's growth while an improper combination may prove to be a curse.

A high degree of operating leverage together with a high degree of financial leverage makes the position of the firm very risky. This is because on the one hand it is employing excessively assets for which it has to pay fixed costs and at the same time it is also using a large amount of debt capital. The fixed costs towards using assets and fixed interest charges bring a greater risk to the firm. In case the earning falls the firm may not be in a position to meet its fixed cost. Moreover, greater fluctuations in earnings are likely to occur on account of the existence of a high degree of operating leverage. Earnings to the equity shareholders will also fluctuate widely on account of existence of a high degree of financial leverage. The existence of a high degree operating leverage will result in a more than proportionate change in operating profits even on account of a small change in sales. The presence of a high degree of financial leverage causes a more than proportionate change in EPS even on account of a small change in EBIT. Thus, a firm having a high degree of financial leverage and a high degree of operating leverage has to face the problems of inadequate liquidity or insolvency in one or the other year. It does not, however, mean that a firm should opt for low degree of operating and financial leverages. Of course, such lower leverage indicates the cautious policy of the management, but the firm will be losing many profit-earning opportunities. A firm should, therefore, make all possible efforts to combine the operating and financial leverages in a way that suits the risk-bearing capacity of the firm.
It may be observed that a firm with high operating leverage should not have a high financial leverage. In fact, it should have a low financial leverage. Similarly, a firm having a low operating leverage will stand to gain by having a high financial leverage provided it has enough profitable opportunities for the employment of borrowed funds. However, low operating leverage and a high financial leverage is considered to be an ideal situation for the maximisation the profits with minimum of risk.

Suggested Reading

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Lesson 5

Theories on Optimum Capital Structure

The basic objective of financial management is to maximize the wealth of shareholders. To achieve the objectives, the company will raise funds basically in two forms - (a) equity, and (b) debt. The cost of equity and cost of debt are the consideration required to be offered to the providers of equity and debt funds. The cost of equity is normally higher than the cost of debt, and the debt fund carry the financial risk. So, in order to achieve the goal of optimum debt equity mix it is necessary that finance manager must conversant with the basic theories of capital structure.

The theories of capital structure explain the extreme views i.e. one view point strongly suggest that financing has a major impact on shareholders wealth while the other view point suggest that financial structure is irrelevant.
There are four major theories of capital structure:

1. Net Income Approach
2. Net Operating Income approach
3. Modigiliani-Miller Approach
4. Traditional Approach

A study of the following basic assumptions is necessary, before we study the capital structure theories under traditional and modern views:

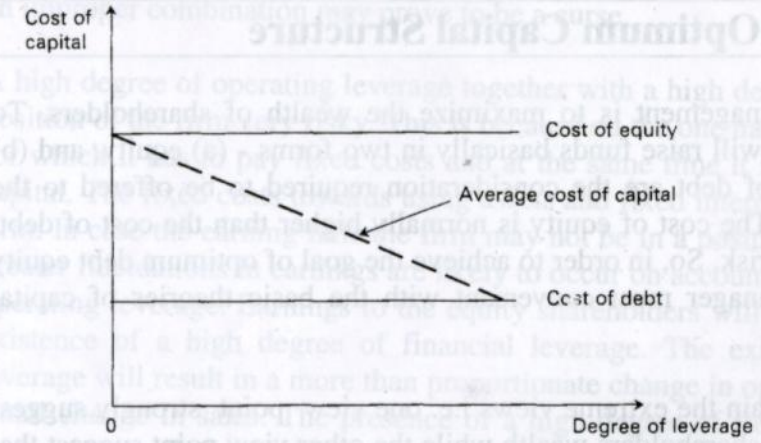
- The company distributes all its earnings as dividends to its shareholders and no consideration of dividend and retention policies.
- The taxation and its effect on cost of capital is ignored.
- Business risk is treated constant at different levels of capital structure of a company.
- There are no transaction costs and a company can alter its capital structure without any transaction costs.
- The continuous and perpetual earning of profits to the expectations of the stockholders.

The following theories study about finding out an optimum capital structure by balancing various costs of financing and financial risks

Net Income Approach

This approach is given by Durand David. According to this approach, the capital structure decision is relevant to the valuation of the firm. As such a change in the capital structure causes an overall change in the cost of capital and also in the total value of the firm. A higher debt content in capital structure means a high financial leverage and this result in decline in the overall or weighted average cost of capital. This results in increase in the value of the firm and also increase in the value of the equity shares. In an opposite situation, the reverse condition prevails. Durand (1952) advocated this approach, according to him the average cost of capital will reduce with greater use of debt and the equity shareholders will not insist for higher return with increased levels of gearing caused by the use of increasing level of debt component. It is also assumed that the lenders will also not insist for higher return with increasing levels of debt. Hence, the average cost of capital falls until the level of debt is

reached since there is no upturn in the cost either equity or debt. The position of the above view is represented in Figure 1.



Assumptions: There are usually three basic assumptions of this approach:

- Corporate taxes do not exist.
- Debt content does not change the risk perception of the investors.
- Cost of debt is less than cost of equity i.e., debt capitalisation rate is less than the equity capitalisation rate.

According to net income approach, the value of the firm and the value of equity are determined as given below:

Value of Firm (V) = S+B

where,

S = Market Value of Equity

B = Market Value of Debt

Market value of Equity (S) = NI / K_e

where

NI = Net income available for equity shareholders

K_e = Equity capitalisation rate

Example1

G Ltd. earned a profit of Rs. 20 lakhs before providing for interest and tax. The company's capital structure is as follows:

1. 4, 00,000 Equity shares of Rs. 10 each and its market capitalisation rate is 16%.
2. 25,000 14% Secured redeemable debentures of Rs. 150 each.

You are required to calculate the value of the firm under 'Net Income Approach'. Also calculate the overall cost of capital of the firm.

Solution:

Value of the Firm (V) = S + B

where

S = Market value of equity

B = Market value of debt

	(Rs)
Profit before interest and tax	20,00,000
Less: Debenture interest (@ 14%)	5,25,000
Net income available to equity shareholders	14,75,000

Market Value of Equity (S)

$S = NI/K_e$

where

NI = Net income available for equity shareholders i.e. Rs. 14, 75,000

Ke = Equity capitalisation rate i.e. 16% or 0.16

$$S = \frac{14,75,000}{.16}$$

$$= \text{Rs } 92,18,750$$

Now, the Value of the Firm

V = S+B

Rs. 92,18,750 + Rs. 37,50,000 = Rs. 1,29,68,750

Calculation of Overall Cost of Capital

$K_e = EBIT/V$

$$= \frac{\text{Rs. } 20,00,000}{\text{Rs. } 1,29,68,750} \times 100 = 15.42\%$$

Net Operating Income Approach

According to 'Net Operating Income Approach (NOI)' the value of the firm is independent of its capital structure. It assumes that the weighted average cost of capital is unchanged irrespective of the level of gearing. The underlying assumption behind this approach is that the increase in the employment of debt capital increases the expected rate of return by the stockholder and the benefit of using relatively cheaper debt funds is offset by the loss arising out of the increase in the cost of equity. A change in proportion of various sources of finance cannot alter the weighted average cost of capital and as such, the value of firm remains unaltered for all degrees of leverage. Under this approach, optimal capital structure does not exist as average cost of capital remains constant for varied types of financing mix. NOI approach is opposite to the NI approach. According to this approach, the market value of the firm depends upon the net operating profit or EBT and the overall cost of capital, weighted average cost of capital (WACC). The financing mix or the capital structure is irrelevant and does not affect the value of the firm.

Assumptions – The NOI approach is based on certain assumptions:

- The investors see the firm as a whole and thus capitalise the total earnings of the firm to find the value of the firm as a whole.

- The overall cost of capital, (K_0) of the firm is constant and depends upon the business risk which also is assumed to be unchanged.
- The cost of debt, (K_d) is also constant.
- There is no tax.
- The use of more and more debt in the capital structure increases the risk of the shareholders and thus results in the increase in the cost of equity capital (Ke).

The NOI approach believes that the market values of the firm as a whole for a given risk complexion. Thus, for a given value of EBIT, the value of the firm remains the same irrespective of the capital composition, and instead depends on the overall cost of the capital.

Value of Firm (V) = $EBIT/K_o$

where

EBIT = Earnings before interest and tax

K_o = Overall cost of capital

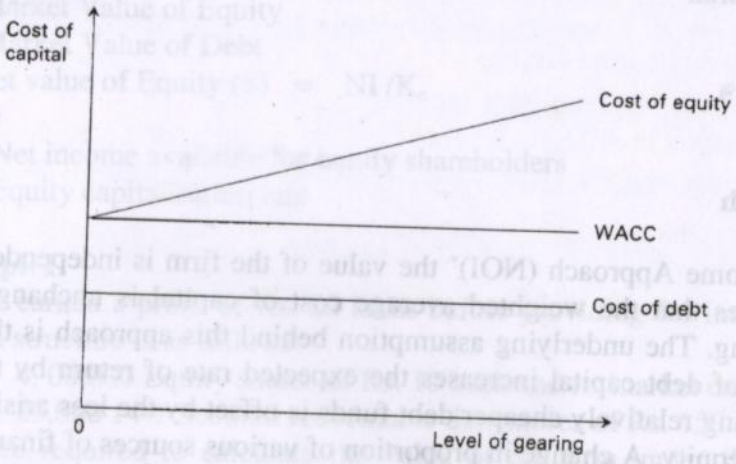
Value of Equity(S) = V- B

where

V= Value of Firm

B= Value of debt

Thus, financing mix is irrelevant and does not affect the value of the firm. The value remains same for all types of debt-equity mix. Since there will be change in risk of the shareholders due to change in debt equity mix, therefore, K_e will be changing linearly with change in debt proportions.



The NOI approach can be illustrated in figure 2 shows that the cost of debt and the overall cost of capital are constant for all levels of leverage. As the debt proportion or the financial leverage increases, the risk of the shareholders also increases and thus the cost of equity capital also increases. However, the increase in cost of equity capital does not affect the overall value of the firm and it remains same. It is to be noted that an all-equity firm, the cost of equity capital is just equal to WACC. As the debt proportion is increased, the cost of equity also increases. However, the overall cost of the capital remains constant because increase in cost of equity is just sufficient to offset the benefit cheaper debt financing. The NOI approach believes that leverage has no effect on the WACC and the value of the firm. Hence, every capital structure is optimal.

Example2

J Ltd has earned a profit before interest and tax Rs. 5 lakhs. The company's capital structure includes 20,000 14% Debentures of Rs.100 each. The overall capitalisation rate of the firm is 16%. Calculate the total value of the firm and the equity capitalisation rate.

Solution

Value of Firm (V)

$$V = \frac{EBIT}{K}$$

Where,

EBIT = Earnings before interest and tax i.e. Rs. 5,00,000

K = Overall capitalisation rate i.e. 16% or 0.16

$$V = \frac{5,00,000}{0.16} = \text{Rs. } 31,25,000$$

Value of Equity (S)

$$S = V - B$$

Where, V = Value of firm

B = Value of debt

$$S = 31,25,000 - 20,00,000 = \text{Rs. } 11,25,000$$

Equity Capitalisation Rate (K_e)

$$K_e = \frac{EBIT - I}{V - B} \times 100$$

$$= \frac{5,00,000 - 2,80,000}{31,25,000 - 20,00,000} \times 100 = \frac{2,20,000}{11,25,000} \times 100 = 19.55\%$$

Verification

The NOI approach can be verified by calculating the overall cost of capital of the firm as follows:

$$K = K_e\left(\frac{S}{V}\right) + K_d\left(\frac{B}{V}\right)$$

$$= 19.555\%\left(\frac{11,25,000}{31,25,000}\right) + 14\%\left(\frac{20,00,000}{31,25,000}\right) = 7.04\% + 8.96\% = 16\%$$

Example3

S Ltd. and W Ltd. are identical in all respects including risk factors except for debt/equity mix. S Ltd. having issued 12% debentures of Rs. 30 lakh, while W Ltd. issued only equity capital. Both the companies earn 24% before interest and taxes on their total assets of Rs. 50 lakh. Assume the corporate effective tax rate of 40% and capitalisation rate of 18% for all equity company.

Compute the value of S Ltd. and W Ltd. using (i) Net Income approach and (ii) Net Operating Income approach.

Solution:

Valuation of companies under Net Income Approach

Particulars	S Ltd	W Ltd
Profit before interest and tax	12,00,000	12,00,000
Less: Debenture Interest @ 12%	3,60,000	-
Profit before tax	8,,40000	12,00,000
Less: Tax @ 40%	3,36,000	4,80,000
Net income available to equity shareholders	5,04,000	7,20,000

Market Value of Equity (S)

$S = NI/K_e$

where

NI = Net income available for equity shareholders

Ke = Equity capitalisation rate

S Ltd = 5, 04, 000/.18
= 28, 00,000

W Ltd = 7, 20,000/.18
= 40, 00,000

Market value of Firm (V)

V = S+B

where

V= Value of Firm

B= Value of debt

S Ltd (V) = 28,00,000+30,00,000 = 58,,00000

W Ltd(V) = 40,00,000+0 = 40,,00000

Valuation of companies under Net Operating Income Approach

Particulars	S Ltd	W Ltd
Capitalisation of earnings @18%	40,00,000	40,00,000
Less: Value of debt	18,00,000	-
Value of Equity	22,00,000	40,00,000
Add: Value of debt	30,00,000	-
Total value of company	5,20,0000	40,00,000

Modigiliani-Miller Approach

The Modigiliani-Miller (MM) approach is similar to the Net Operating Income (NOT) approach. In other words, according to this approach, the value of a firm is independent of its capital structure. However, there is a basic difference between the two. The NOI approach is purely definitional or conceptual. It does not provide operational justification for irrelevance of the capital structure in the valuation of the firm. While MM approach supports the NOI approach providing behavioural justification for the independence of the total valuation and the cost of capital of the firm from its capital structure. In other words, MM approach maintains that the average cost of capital does not change with change in the debt weighed equity mix or capital structure of the firm. It also gives operational justification for this and not merely states only a proposition.

Basic Propositions: The following are the three basic propositions of the MM approach:

1. The overall cost of capital (K) and the value of the firm (V) are independent of the capital structure. In other words K and V are constant for all levels of debt-equity mix. The total market

value of the firm is given by capitalising the expected net operating income (NOI) by the rate appropriate for that risk class.

2. The cost of equity (k_e) is equal to capitalisation rate of a pure equity stream plus a premium for the financial risk. The financial risk increases with more debt content in the capital structure. As a result, k_e increases in a manner to off set exactly the use of a less expensive source of funds represented by debt.

3. The cut-off rate for investment purposes is completely independent of the way in which an investment is financed.

Assumptions: The MM approach is subject to the following assumptions:

1. Capital markets are perfect. This means —
   (a) Investors are free to buy and sell securities;
   (b) The investors can borrow without restriction on the same terms on which the firm can borrow;
   (c) The investors are well informed;
   (d) The investors behave rationally; and
   (e) There are no transaction costs.
2. The firms can be classified into homogeneous risk classes. All firms within the same class will have the same degree of business risk.
3. All investors have the same expectation of a firm's net operating income (EBIT) with which to evaluate the value of any firm.
4. The dividend pay-out ratio is 100%. In other words, there are no retained earnings.
5. There are no corporate taxes.

In brief, the MM hypothesis can be put in the following words: "MM hypothesis based on the idea that no matter how you divide up the capital structure of a firm among debt, equity and other claims, there is a conservation of investment value. That is, because the total investment value of a corporation depends upon its underlying profitability and risk. It is invariant with respect to relative changes in the firm's financial capitalisation. Thus, the total pie does not change as it is divided into debt, equity, and other securities. The sum of the parts must equal the whole; so regardless of financing mix, the total value of the firm stays the same".

Arbitrage Process

The "arbitrage process" is the operational justification of MM hypothesis. The term 'Arbitrage' refers to an act of buying an asset or security in one market having lower price and selling it in another market at a higher price. The consequence of such action is that the market price of the securities of the two firms exactly similar in all respects except in their capital structures cannot for long remain different in different markets. Thus, arbitrage process restores equilibrium in value of securities. This is because in case the market value of the two firms, which are equal in all respects except their capital structures, are not equal investors of the overvalued firm would sell their shares, borrow additional funds on personal account and invest in the undervalued firm in order to obtain the same return on smaller investment outlay. The use of debt by the investor for arbitrage is termed as 'home made' or 'personal leverage'. This will be clear with the following example.

Example 4

Two firms A and B are identical in all respects except that the firm A has 10% Rs. 50,000 debentures. Both the firms have the same earnings before interest and tax amounting to Rs. 10,000. The equity capitalisation rate of firm A is 16% while that of firm B is 12.5%.

You are required to calculate the total market value of each of the firms and explain with an example the working of the 'arbitrage process'.

Solution:

STATEMENT SHOWING THE TOTAL VALUE OF THE FIRMS

Particulars	*Firm A* Rs.	*Firm B* Rs.
Earnings before Interest & Tax (*EBIT*)	10,000	10,000
Less: Interest	5,000	—
Earnings available for Equity Shareholders	5,000	10,000
Equity Capitalisation Rate (*Ke*)	16%	12.5%
Total Market value of Equity (*S*):		
Firm A : $\frac{5,000}{16} \times 100$	31,250	—
Firm B : $\frac{10,000}{12.5} \times 100$	—	80,000
Total Market Value of Debt (*B*)	50,000	—
Total Value of Firm (*V*)	81,250	80,000
Overall cost of Capital (*k*) : *EBIT/V* :		
Firm A : $\frac{10,000}{81,250} \times 100$	12.3%	—
Firm B : $\frac{10,000}{80,000} \times 100$	—	12.5%
Debt-Equity Ratio : (*B/S*):		
Firm A : $\frac{50,000}{81,250}$	0.6	

Working of the Arbitrage Process

The above table shows that market value of the firm A having debt content in its capital structure is higher than the market value of the firm B which does not have any debt content in its capital structure.

According to MM Hypothesis, this situation cannot continue for long on account of working of the arbitrage process. The investors in company B can earn a higher return on their investment with a lower financial risk. Hence, the investors in company A will start selling their shares and start buying shares in company B. These arbitrage transactions will continue till company A's shares decline in price and B's shares increase in price enough to make the total value of the two firms identical. This can be understood with the following example:

Suppose there is an investor X. He holds 10% of the outstanding shares of firm A. This means his holding amounts to Rs. 3,125 (ie 10% of Rs. 31,250) and his share in the earnings which belongs equity shareholders would amount to Rs. 500 (ie., 10% of Rs. 5,000).

Mr. X will sell his holding in firm A and invest money in firm B. Firm B has no debt in its capital structure and hence, the financial risk to Mr. X would be less in firm B as compared to firm A. In order to have the same degree of financial risk in firm B, Mr. X will borrow additional funds equivalent to his proportionate share in firm A debt on his personal account, i.e., Rs. 5,000 (10% of Rs. 50,000) at 10% interest. The effect of such borrowing is that he will substitute

personal leverage for the corporate leverage. The proportionate holdings of Mr. X in firm B will now amount to Rs. 8,000 (i.e., 10% Rs. 80,000). The position of Mr. X can now be summarised as follows:

(A) Mr. Xs position in firm A with 10% equity holding:

(i) Investment Outlay Rs. 3,125: and

(iij Dividend income 10% of Rs. 5,000 = 500

Return on Own Funds = 500/ 3125 x 100 = 16%

(B) Mr. Xs position in firm B with 10% equity holding:

(i) Investment Outlay (own Funds Rs. 3,000 + borrowed funds Rs. 5,000) =8000

(ii) Dividend Income:

Total income 10% of Rs. 10,000 = 1000

Less: Interest payable on borrowed funds

10% on Rs. 5,000 = 500 500

Return on Own Funds= 500/3000 x 100 = 16.67%

(C) Mr. Xs position in firm B, if he invests the total available funds:

(i) Total investment outlay:

(Own funds Rs. 3,125 + borrowed funds Rs. 5,000) = 8125

(ii) Total income (10000/80000 x 8,125) = 1016

Less: Interest payable on borrowed funds = 500 =516

Return on Own Funds = 516/3125 x 100 =16.51%

The above analysis shows that Mr. X can have a higher income in case he shifts his investments from firm A to firm B. Other investors will also follow the same process. As a result there will be an increase in demand for the securities of firm B which will lead to increase market price of its shares. Simultaneously, the price of the shares of Firm A will decline. This firm A will decline. This process will continue till it is possible to reduce the investment outlays and get the same return. Beyond this point, shifting from firm A to firm B will not be beneficial. This is called as the point of equilibrium. At this level, the total value of the two firms as well as the overall cost of the capital would be the same.

Thus, according to MM hypothesis, the total value of levered firm (i.e., a firm having debt content in its capital structure) cannot be more than that of an unlevered firm. The reverse is also true, i.e., the value of an unlevered firm cannot be greater than the value of a levered firm. This is again because of the setting in of the arbitrage process, which will decrease the market value of the unlevered firm and increase that of the levered firm.

Limitations of MM Hypothesis

The Arbitrage process is the behavioural foundation for the MM hypothesis. However, the arbitrage process fails to bring the desired equilibrium in the capital markets on account of the following reasons: -

1. Rates of Interest are not the same for the individuals and the Firms.

The assumption made under the MM hypothesis that the firms and individuals can borrow and lend at the same rate of interest does not hold good in actual practice. This is because firms have the higher credit standing as compared to the individuals on account of firm's holding substantial fixed assets.

2. Home made Leverage is not Perfect Substitute for Corporate Leverage.
The risk to which an investor is exposed is not identical when the investor himself borrows proportionate to his share in the firm's debt and when the firm itself borrows. As a matter of fact, the risk exposure to the investor is greater in the former case as compared to the latter. When the firm borrows, the liability of the investor is limited only to the extent of his proportionate shareholding, in case the company is forced to go for its liquidation. However, when an individual borrows, he has an unlimited liability and even his personal property can be used for payment to his creditors.
3. Transaction Costs Involved.
Buying and selling of securities involves transaction costs. It would therefore become necessary for investor to invest a larger amount in the shares of the unlevered/levered firms than his present investment to earn the same return.
4. Institutional Restrictions.
The switching option from unlevered to levered firm and vice-versa is not available to all investors, particularly, institutional investors, viz., Life Insurance Corporation of India, Unit Trust of India, Commercial Banks, etc. Thus, the institutional restrictions stand in the way of smooth operation of the arbitrage process.
5Corporate Taxes frustrate MM Hypothesis.

On account of corporate taxes, it is a known fact that the cost of borrowing funds to the firm is less than the contractual rate of interest. As a result total return to the shareholders of an unlevered firm is always less than that of the levered firm. Thus, the total market value of a levered firm tends to exceed that of the unlevered firm on account of this very reason.

Traditional Approach

The Net Income (NI) Approach and Net Operating Income (NOI) Approach represent two extremes. According to NI approach the debt content in the capital structure affects both the overall cost of capital and total valuation of the firm while NOI approach suggests that capital structure is totally irrelevant so far as total valuation of the firm is concerned. The MM approach supports the NOI approach. However, the limitations of MM approach are with its assumptions is of doubtful validity. The traditional approach or the intermediate approach is a mid-way between the two approaches. It partly contains features of both the approaches as given below:

1. The traditional approach is similar to NI Approach to the extent that it accepts that the capital structure or leverage of the firm affects the cost of capital and its valuation. However, it does not subscribe to the NI approach that the value of the firm will necessarily increase with all degree of leverages.
2. It subscribe to the NOI approach that beyond a certain degree of leverage, the overall cost of capital increases resulting in decrease in the total value of firm. However, it differs from NOI approach in the sense that the overall cost of capital will not remain constant for all degree of leverages.

The essence of the Traditional Approach lies in the fact that a firm through judicious use of debt-equity mix can increase its total value and thereby reduce its overall cost of capital. This is because debt is relatively a cheaper source of funds as compared to raising money through shares because of tax advantage. However, beyond a point raising of funds through debt may become a financial risk and would result in a higher equity capitalisation rate. Thus, upto a point, the content of debt in the capital structure will favourably affect the value of a firm. However, beyond that point, the use of debt will adversely affect the value of the firm. At this level of debt-

equity mix, the capital structure will be optimum. At this level, the average or the composite cost of capital will be the least. In other words, here the marginal real cost of equity will be equal to marginal real cost (both implicit and explicit) of debt.

Example 5

In considering the most desirable capital structure for a company, the following estimates of the cost of debt and equity capital (after tax) has been made at various levels of debt-equity mix:

Debt as percentage of total capital employed	*Cost of Debt (%)*	*Cost of Equity (%)*
0	5.0	12.0
10	5.0	12.0
20	5.0	12.5
30	5.5	13.0
40	6.0	14.0
50	6.5	16.0
60	7.0	20.0

You are required to determine the optimal debt equity mix for the company by calculating composite cost of capital.

Solution:

STATEMENT SHOWING THE COMPANY'S COMPOSITE COST OF CAPITAL (AFTER TAX)

Debt as percentage of total capital employed	*Cost of Debt %*	*Cost of Equity %*	*Composite Cost of Capital %*
0	5.0	12.0	5 × 0 + 12 × 1.00 = 12.00
10	5.0	12.0	5 × .10 + 12 × .90 = 11.30
20	5.0	12.5	5 × .20 + 12.5 × .80 = 11.00
30	5.5	13.0	5.5 × .30 + 13 × .70 = 10.75
40	6.0	14.0	6 × .40 + 14 × .60 = 10.80
50	6.5	16.0	6.5 × .50 + 16 × .50 = 11.25
60	7.0	20.0	7 × .60 + 20 × .40 = 12.20

Optimal debt equity mix is 30% debt and 70% equity, where the composite cost of capital is least.

Determination of Optimum Capital Structure

Determination of optimum capital structure is a difficult task. At optimum capital structure, the value of an equity share is the maximum while the average cost of capital is the minimum. The value of an equity share mainly depends on earning per share. So long the "Return on Investment" (ROI) is more than cost of borrowings, each rupee of extra borrowing pushes up the earning per equity share which in turn pushes up the market value of the share. It means the company can borrow till the interest rate on borrowings is equal to or does not exceed the return from the project. However each extra rupee of borrowings increases the risk and therefore, in spite of increase in the earning per equity share, the market value of the equity share may fall because of investors taking it as a more risky company. Of course, in some cases, in spite of increase in risk, the value of a company's equity shares may increase because of investors' speculation on future profits.

It is almost impossible to precisely measure the fall in the market value of an equity share on account of increase in risk due to high debt content. Market factors are highly psychological, complex and don't follow always accepted theoretical principles since capital markets are never perfect.

Thus, it is not possible to find out the exact debt-equity mix where the capital structure would be optimum. Of course, a range can be determined on the basis of empirical study within which if the company maintains its debt-equity mix, the investors will not discount its shares. For example, a company belongs to an industry where the average debt-equity ratio is of 1: 1. Empirical studies disclosed that the investors do not discount the value of the company's shares so long debt-equity ratio remains within 40% of the industry's average, i.e., between, 0.6: 1 and 1.4: 1.

This means that if the company maintains capital structure within this range, the value of the equity share will not decline due to more risk perceived by the investors. In order to have the maximum tax advantage on the interest payable, the company may maintain debt-equity ratio near the top of the range keeping in view other factors such as profitability, solvency, flexibility, control, etc.

The capital structure so arrived at may not be optimum but would be the most reasonable under the circumstances. Some people, therefore, prefer to use the term "appropriate or sound capital structure" in place of the term "optimum capital structure", the former being more a realistic term than the latter.

Suggested Reading

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Lesson 6

Determinants of Capital Structure

The capital structure of the company is determined at the time when the company is started. Great caution is required at this stage as the initial capital structure will have long term implications. Therefore, it is necessary to understand what optimum capital structure is and what are the determinants of capital structure.

The optimum capital structure is that capital structure or combination of debt and equity that leads to the maximization of the value of the firm. The capital structure decision is important to the firm; the optimum capital structure minimizes the firm's overall cost of capital and maximizes the value of the firm. The use of debt funds in capital structure increases the EPS as the interest on debt is tax deductible which leads to increase in share price. But higher levels of debt funds in capital structure result in greater financial risk and it leads to higher cost of capital and depresses the market price of company's share. Therefore, the firm should try to achieve and maintain the optimum capital structure keeping in view value maximization objective of the firm.

Sometimes, the capital structure is also referred as 'appropriate capital structure' and 'sound capital structure'. Ordinarily infant companies (or new companies) cannot collect sufficient debt as per their requirements so easily because they are yet to establish their creditworthiness in the market. Naturally, they have to depend on equity very much. But established companies generally have track record of their profit earning capacity, which helps them to create their creditworthiness. The lenders feel safe to invest their funds in this type of companies. Naturally, there is ample scope for this type of companies to collect debt. But a company cannot accept debt freely i.e., without, having any limit. The company must have to chalk out a plan to collect debt in such a way that the acceptance of debt becomes beneficial for the company in terms of increase in EPS, profitability and the value of the firm. If the cost of capital is greater than the return, it will have an adverse effect on company's profitability, value of the firm and its EPS. Similarly, if company is unable to repay the debt within the scheduled period (may be due to some other reasons) it will affect the goodwill of the company in the credit market and consequently may create problems in future for collecting further debt.

The determination of capital structure in practice involves additional considerations in addition to the concerns about EPS, market value and cash flow. A firm may have enough debt servicing ability but it may not have assets to offer as collateral. Attitudes of firms with regard to financing decisions may also be quite often influenced by their desire of not losing control, maintaining operating flexibility and have convenient timing and cheaper means of raising funds. Some of the most important considerations are discussed below.

Nature of Assets

The forms of assets held by a company are important determinants of its capital structure. Tangible fixed assets serve as collateral to debt. In the event of financial distress, the lenders can access these assets and liquidate them to realise funds lent by them. Companies with higher tangible fixed assets will have less expected costs of financial distress and hence, higher debt ratios. On the other hand, those companies, whose primary assets are intangible assets, will not have much to offer by way of collateral and will have higher costs of financial distress.

Companies have intangible assets in the form of human capital, relation with stakeholders, brands, reputation etc. and their values start eroding as the firm faces financial difficulties and its financial risk increases.

Growth Opportunities

The nature of growth opportunities has an important influence on a firm's financial leverage. Firms with high market-to-book values ratios have high growth opportunities. A substantial part of the value of these companies comes from organizational or intangible assets. These firms have a lot of investment opportunities. There is also higher threat of bankruptcy and high costs of financial distress associated with high growth firms once they start facing financial problems. These firms employ lower debt ratios to avoid the problem of under-investment and cost of financial distress. But bankruptcy is not the only time when debt financed high-growth firms let go of the valuable investment opportunities. When faced with the possibility of interest default, managers tend to be risk averse and either put of major capital projects or cut down on R&D expenses or both.

Therefore, firms with growth opportunities will probably find debt financing quite expensive in terms of high interest to be paid to lack of good collateral and investment opportunities to be lost. High growth firms would prefer to take debts with lower maturities to keep interest rates down and to retain the financial flexibility since their performance can change unexpectedly any time. They would also prefer unsecured debt to have operating flexibility.

Mature firms with low market-to-book value ratio and limited growth opportunities face the risk of managers spending free cash flow either in unprofitable maturing business or diversifying into risky businesses. Both these decisions are undesirable. This behaviour of managers can be controlled by high leverage that makes them more careful in utilizing surplus cash. Mature firms have tangible assets and stable profits. They have low costs of financial distress. Hence, these firms would raise the debt with longer maturities as the interest rates will not be high for them and they have a lesser need of financial flexibility since their fortunes are not expected to shift suddenly. They can avail high interest tax shields by having high leverage ratios.

Nature of Industry

The nature of industry is one of the most important elements in determining the degree of financial leverage a firm can carry safely without any risk of bankruptcy. If an industry's sales are subject to wide fluctuations, over a business cycle, the firm should have a low degree of financial leverage. Such firms will already have a high operating leverage. In case both are high, the total risk of the firm as determined by the combined leverage the product of operating leverage and financial leverage) would become unduly high. The firms with high debt ratios belonging to industries such as refrigeration, televisions, machine tools and capital equipment manufacturing, run the risk of not being able to meet the required payments in lean years which would cause financial distress. Clearly, such firms should have a more conservative capital structure and rely less on debt. On the other hand, industries dealing with non-durable consumer goods (food) or with inexpensive items (paper clips, match boxes) or with items in habitual use (cigarettes) or all those products which have an inelastic demand are not likely to be subject to wide fluctuations in sales. Such industries can afford to have higher debt proportions in capital structure as in lean years they do not run the risk of being unable to meet their commitments.

Judging industry by its competitive nature, it may be inferred that those industries which have keen competition among themselves should have a relatively greater proportion of equity than debt. For example, in the garment industry much of the competition is based on style. The styles being unpredictable and transitory the profits also fluctuate accordingly. Therefore, such firms should emphasize equity over debt because of the excessive risk of not being able to meet payments on borrowed funds. At the other extreme, there are public utility undertakings involved in the production of electricity, gas, water, transportation services or telephone services, which are relatively free from intra-industry competition. Their sales are more stable and predictable. There fore, such companies can afford to use more debt.

The stage of the life cycle of the industry has also a crucial bearing in assigning relative weightage to various sources of raising finance. If the industry is in its infancy, the probability of the rate of mortality would be high. Therefore, more emphasis needs to be placed on equity capital. The firm would do well to avoid seeking funds from senior securities which require fixed payments. At such a stage, risk outweighs the attractions of financial leverage. When the industry has reached maturity and is passing through the period of rapid growth, the firm should pay special attention to maneuverability to assure that as it grows it obtains funds when needed and under acceptable terms. If the outlook is for a long-term decline in business, the firm should build such a plan which allows for easy contraction in the sources of the funds used. For this purpose, the firm can have 'call' provision in the case of senior securities.

Debt and Non-debt Tax Shields

Debts, due to interest deductibility reduce the tax liability and increase the firm's after-tax free cash flows. In the absence of personal taxes, the interest tax shields increase the value of the firm. Generally, investors pay taxes on interest income but not on equity income. Hence, personal taxes reduce the tax advantage of debt over equity. The tax advantage of debt implies that firms will employ more debt to reduce tax liabilities and increase value. In practice, this is not always true as is evidenced from many empirical studies. Firms also have non debt tax shields available to them. For example, firms can use depreciation; carry forward losses etc. to shield taxes. This implies that those firms that have larger non-debt tax shields would employ low debt, as they may not have sufficient taxable profit available to have the benefit of interest deductibility. However, there is a link between the non-debt tax shields and the debt tax shields since companies with higher depreciation would tend to have higher fixed assets, which serve as collateral against debt.

Financial Flexibility and Operating Strategy

A cash flow analysis might indicate that a firm could carry high level of debt without much threat of insolvency. But in practice, the firm may still make conservative use of debt since the future is uncertain and it is difficult to be able to consider all possible scenarios of adversity. It is, therefore, prudent to maintain financial flexibility that enables the firm to adjust to any change in the future events or forecasting error.

Financial flexibility is a serious consideration in setting up the capital structure policy. Financial flexibility means a company's ability to adapt its capital structure to the needs of the changing conditions. The company should be able to raise funds, without undue delay and cost, whenever needed, to finance the profitable investments. It should also be in a position to redeem its debt whenever warranted by the future conditions. The financial plan of the company should be flexible enough to change the composition of the capital structure as warranted by the company's

operating strategy and needs. It should also be able to substitute one form of financing for another to economise the use of funds. Flexibility depends on loan covenants, option to early retirement of loans and the financial slack, viz., excess resources at the command of the firm.

Loan Covenants

Restrictive covenants are commonly included in the long-term loan agreements and debentures. These restrictions curtail the company's freedom in dealing with the financial matters and put it in an inflexible position. Covenants in loan agreements may include restrictions to distribute cash dividends, to incur capital expenditure, to raise additional external finances or to maintain working capital at a particular level. The types of covenants restricting the firm's investment, financing and dividend policies vary depending on the source of debt. While private debt contains both affirmative and negative covenants, public debt has a lot of negative covenants and commercial paper does not entail much restrictions.

Loan covenants may look quite reasonable from the lenders' point of view as they are meant to protect their interests, but they reduce the flexibility of the borrowing company to operate freely and it may become burdensome if conditions change. Growth firms prefer to take private rather than public debt since it is much easier to renegotiate terms in time of crisis with few private lenders than several debenture-holders. Generally a company while issuing debentures or accepting other forms of debt should ensure to have minimum of restrictive clauses that circumscribe its financial actions in the future in debt agreements. This is a tough task for the financial manager. A highly levered firm is subject to many constraints under debt covenants that restrict its choice of decisions, policies and programmes.

Violation of covenants can have serious adverse consequences. The firm's ability to respond quickly to changing conditions also reduces. The operating inflexibility could prove to be very costly for the that are operating in unstable environment. These companies are likely to have low debt ratios and maintain high financial flexibility to remain competitive and not allow compromising their competitive posture. Thus, financial flexibility is essential to maintain the operating flexibility and face unanticipated contingencies.

Financial Slack

The financial flexibility of a firm depends on the financial slack it maintains. The financial slack includes unused debt capacity, excess liquid assets, unutilised lines of credit and access to various untapped sources of funds. The financial flexibility depends a lot on the company's debt capacity and unused debt capacity. The higher is the debt capacity of a firm and the higher is the unused debt capacity; the higher will be the degree of flexibility enjoyed by the firm. If a company borrows to the limit of its debt capacity, it will not be in a position to borrow additional funds to finance unforeseen and unpredictable demands except at restrictive and unfavourable terms. Therefore, a company should not borrow to the limit of its capacity, but keep available some unused capacity to raise funds in the future to meet some sudden demand for finances.

Early repayment: A considerable degree of flexibility will be introduced if a company has the discretion of early repaying its debt. This will enable management to retire or replace cheaper source of finance for the expensive one whenever warranted by the circumstances. When a company has excess cash and does not have profitable investment opportunities it becomes desirable to retire debt. Similarly, a company can take advantage of declining rates of interest if

it has a right to repay debt at its option. Suppose that funds are available at 12 per cent rate of interest presently. The company has outstanding debt at 16 per cent rate of interest. It can save to terms of interest cost if it can retire the 'old' debt and replace it by the new debt.

Limits of financial flexibility: Financial flexibility is useful, but the firm must understand its limit. It can help a profitable firm to seize opportunities, and it can provide temporary help in adverse situation, but it cannot save a firm, which is basically unhealthy. No doubt that financial flexibility is desirable, but the firm should have basic financial strength. Also, it is achieved at a cost. A company trying to obtain loans on easy terms will have to pay interest at a higher rate. Also, to obtain the right of refunding, it may have to compensate lenders by paying a higher interest or may have to allow them to participate in the equity. Therefore, the company should compare the benefits and costs of attaining the desired degree of flexibility and balance them properly.

Leverage ratio for the other firms

Another approach to the capital structure decisions is to make a comparison with the debt- equity ratios of companies belonging to the same industry, having a similar business risk. The rationale of the use of industry standards is that debt-equity ratios appropriate for other firms in a similar line of business should be appropriate for the company as well. Industry standards provide a useful benchmark. If the firm is out of line, it is conspicuous in the market place. This does not necessarily imply that the firm's capital structure planning is inappropriate. It may well be possible that other firms may not be using appropriate debt-equity ratios. They may be more conservative or more aggressive risk-takers than desired. However, comparison is helpful as it acts as a red signal to the management that there may be something wrong with the debt-equity mix of the company. In other words, what it suggests is that if a firm is out of line, it should know the reasons why and be satisfied that there are good reasons for it.

Sustainability and Feasibility

The financing policy of a firm should be sustainable and feasible in the long run. Most firms want to maintain the sustainability of their financing policy over a long period of time. The sustainability growth model helps to analyse the sustainability and the feasibility of the long-term financial plans in achieving growth. This model is based on the assumption that the firm uses the internal financing and debt, consistent with the target debt-equity ratio and payout ratio and does not issue shares during the planning horizon. Given the firm's financing and payout policies and operating efficiency, this model implies that its assets and sales will grow in tandem with growth in equity (internal). Thus, the sustainable growth depends on return on equity (ROE) and retention ratio:

Sustainable growth ROE x (1 —payout)

ROE depends on assets turnover, net margin, and financial leverage:

ROE =asset turnover x net margin x leverage

ROE = assets/sales x net profit/sales x assets/equity

Alternatively, ROE depends on the firm's before-tax return on capital employed (ROCE), the financial leverage premium and the tax rate:

$ROE = (ROCE+(ROCE-K_d)D/E)(1-T)$

The sustainable growth model indicates the growth rate that the firm should target. Any other growth rate will not be consistent with the financial policies set by the management. If the firm intends to achieve a different growth rate than that implied by the sustainable growth model, it

will have to change its financial policy, either the debt-equity ratio, or the payout ratio or both. In fact, the model also indicates the trade -offs between the financing and operating policies. Instead of changing its financial policies for achieving higher growth, the firm can examine its operating policies vis-à-vis price, cost, assets utilisation etc. The firm must realise that growth does not ensure value creation. If the firm does not account for the investment duration and the cost of capital, growth may destroy value. The firm should also examine the impact of alternative financial policy on the value of the firm.

Control

In designing the capital structure, sometimes the existing management is governed by its desire to continue control over the company. This is particularly so in the case of the firms promoted by entrepreneurs. The existing management team not only wants control and ownership but also to manage the company, without any outside interference.

Widely held companies: The ordinary shareholders elect directors of the company. If the company issues new shares, there is risk of dilution of control. The company can issue rights shares to avoid dilution of ownership. But the existing shareholders may not be willing to fully subscribe to the issue. Dilution is not a very important consideration in the case of widely held companies. Most shareholders are not interested in taking active part in a company's management. Nor do they have time and money to attend the meetings. They are interested in dividends and capital gains. If they are not satisfied, they will sell their shares. Thus, the best way to ensure control and to have the confidence of the shareholders is to manage the company most efficiently and compensate shareholders in the form of dividends and capital gains. The risk of loss of control can be reduced by distribution of shares widely and in small lots.

Closely held companies: The consideration of maintaining control may be significant in case of closely held and small companies. A shareholder or a group of shareholders can purchase all or most of the new shares of a small or closely held company and control it. Even if the owner-managers hold the majority shares their freedom to manage the company will be curtailed when they go for initial public offerings (IPOs). Fear of sharing control and being interfered by others often delays the decision of the closely held small companies to go public. To avoid the risk of loss of control, small companies may slow their rate of growth or issue preference shares or raise debt capital. If the closely held companies can ensure a wide distribution of shares, they need not worry about the loss of control so much.

The holders of debt do not have voting rights. Therefore, it is suggested that a company should use debt to avoid the loss of control. However, when a company uses large amount of debt, a lot of restrictions are put by the debt-holders, specifically the financial institutions in India, since they are the major providers of loan capital to the companies. These restrictions curtail the freedom of the management to run the business. A very excessive amount of debt can also cause serious liquidity problem and ultimately render the company sick, which means a complete loss of control.

Marketability and Timing

Marketability means the readiness of investors to purchase a security in a given period of time and to demand reasonable return. Marketability does not influence the initial capital structure, but it is an important consideration to decide about the appropriate timing of security issues. The

capital markets are changing continuously. At one time, the market favours debenture issues, and, at another time, it may readily accept share issues. Due to the changing market sentiments, the company has to decide whether to raise funds with an equity issue or a debt issue. The alternative methods of financing should, therefore be evaluated in the light of general market conditions and internal conditions of the company.

Capital market conditions: If the capital market is depressed, a company will not issue equity shares, but it may issue debt and wait to issue equity shares till the share market revives. During boom period in the share market, it may be advantageous for the company to issue shares at high premium. This will help to keep its debt capacity unutilised. The internal conditions of a company may also dictate tile marketability of securities. For example, a highly levered company may find it difficult to raise additional debt. Similarly, when restrictive covenants in existing debt agreements preclude payment of dividends on equity shares, convertible debt may be the only source to raise additional funds.

A small company may find difficulty in issuing any security in the market merely because of its small size. The heavy indebtness, low payout, small size, low profitability, high degree competition etc. cause low rating of the company, which would make it difficult for the company to raise external finance at favourable terms.

Issue Costs

Issue or flotation costs are incurred when the funds are externally raised. Generally, the cost of floating a debt is less than the cost of floating an equity issue. This may encourage companies to use debt than issue equity shares. Retained earnings do not involve flotation costs. The source of debt also influences the issue costs with fixed costs being much higher for issue of commercial paper and public debt (debenture) than the private debt. This also means that economies of scale are high for the debt instruments having high fixed costs. Hence these instruments should be used when large amounts of funds are needed. Issue costs as a percentage of funds raised will decline with larger amount of funds. Large firms require large amounts of funds, and they may plan large issues of securities to economise on the issue costs. These firms are more likely than others to resort to commercial paper or public debt for raising capital. A large issue of securities can, however, curtail a company's financial flexibility. The company should raise only that much of funds, which it can employ profitably. Many other more important factors have to be considered when deciding about the methods of financing and the size of a security issue.

Capacity of Raising Funds

The size of a company may influence its capital and availability of funds from different sources. A small company finds great difficulties in raising long-term loans. If it is able to obtain some long-term loan, it will be available at a higher rate of interest and inconvenient terms. The highly restrictive covenants in loan agreements in case of small companies make their capital structures very inflexible and management cannot run business freely without interference. Small companies, therefore, depend on share capital and retained earnings for their long-term funds requirements. It is quite difficult for small companies to raise share capital in the capital markets. Also, the capital base of most small companies is so small that they can not be listed on the stock exchanges. For those small companies, which are able to approach the capital markets, the cost of issuing shares is generally more than the large ones. Further, resorting frequently to ordinary share issues to raise long-term funds carries a greater risk of the possible loss of control for a small company. The shares of small companies are not widely scattered and the dissident group

of shareholders can be easily organised to get control of the company. The small companies, therefore, sometimes limit the growth of their business to what can easily be financed by retaining the earnings.

A large company has relative flexibility in designing its capital structure. It can obtain loans on easy terms and sell ordinary shares, preference shares and debentures to the public. Because of the large size of issues, its cost of distributing a security is less than that for a small company. A large issue of ordinary shares can be widely distributed and thus, making the loss of control difficult. The size of the firm has an influence on the amount and the cost of funds, but it does not necessarily determine the pattern of financing. In practice, the debt-equity ratios of the firms do not have a definite relationship with their size.

Consultation with investment bankers and lenders

Another useful approach in deciding the proportion of various securities in a firm's structure is to seek the opinion of investment analysts, institutional investors, investment bankers and lenders. These analysts, having been in business for a considerable period of time, acquire expertise and have access to information regarding securities of a large number of companies and know how the market evaluates them. They are, therefore, in a better position to assess a particular financial plan.

Similarly, the opinions of prospective lenders and investors are likely to be very useful to the firm; it is they who will ultimately provide funds to the firm. Therefore, the type of securities which they will prefer to buy is very significant information for the financial manager and helps him in taking a decision regarding the form of securities to be issued. It is imperative that if a financial decision is to contribute to the valuation of the firm, the finance manager must think in a way similar to that of the investors.

Maintaining Maneuverability for Commercial Strategy

Maneuverability refers to a firm's ability to adjust its sources of funds in either direction—increase or decrease—in response to changes in the need for funds. That is, the finance manager must keep himself in a situation where he can change positions. Therefore, while designing the capital structure, he should not lose sight of the future impact on the present financial plan. For instance, the firm may adopt an aggressive debt policy as it looks good at one point but if in future the firm is in need of additional funds, it may be forced to issue equity shares on unfavourable terms as the firm has a too heavy debt and is therefore unable to obtain funds in this form. Due to increased financial risk, the cost of equity would be higher. Clearly, the opportunity cost of an unwise debt- policy could turn out to be very high. Therefore, in order to preserve operating flexibility, a firm is well advised to have unused debt capacity for future needs, that is it should operate below the maximum safe debt level. The preservation of unused debt capacity can be an important consideration for the company whose funds requirements are sudden and unpredictable. It gives the company financial maneuverability by virtue of leaving the options opens.

Capital Structure Practices in India

• Indian corporates employ substantial amount of debt in their capital structure in terms of the debt-equity ratio as well as total debt to total assets ratio. Nonetheless, the foreign controlled companies in India use less debt than the domestic companies. The dependence of the Indian

corporate sector on debt as a source of finance has over the years declined particularly since the mid-nineties.

- The corporate enterprises in India seem to prefer long-term borrowings over short-term borrowings. Over the years, they seem to have substituted short-term debt for long-term debt. The foreign controlled companies use more long-term loans relatively to the domestic companies.
- As a result of debt-dominated capital structure, the Indian corporates are exposed to a very high degree of total risk as reflected in high degree of operating leverage and financial leverage and, consequently, are subject to a high cost of financial distress which includes a broad spectrum of problems ranging from relatively minor liquidity shortages to extreme cases of bankruptcy. The foreign controlled companies however, are exposed to lower overall risk as well as financial risk.
- The debt service capacity of the sizeable segment of the corporate borrower as measured by (i) interest coverage ratio and (ii) debt service coverage ratio is inadequate and unsatisfactory.
- Retained earnings are the most favoured source of finance. There is significant difference in the use of internally generated funds by the highly profitable corporates relative to the low profitable firms. The low profitable firms use different form of debt funds more than the highly profitable firms.
- Loan from financial institutions and private placement of debt are the next most widely used source of finance. The large firms are more likely to issue bonds in the market than small corporates.
- The hybrid securities are the least popular source of finance amongst corporate India. They are more likely to be used by low growth firms. Preference shares are used more by public sectors units and low growth corporates.
- Equity capital as a source of funds is not preferred across the board.

Suggested Reading

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Lesson 7

Theories of Dividend

Introduction

The dividend decision of the firm is of crucial importance for the financial manager since it determines the amount of profit to be distributed among shareholders and the amount of profit to be retained in the business (popularly termed as retained earnings) for financing its long-term growth. There is a reciprocal relationship between the cash dividends and retained earnings. Larger dividends result in less retained earnings. Less dividends result in larger retained earnings. While taking dividend decision, the management will obviously take into account the effect of the decision on the maximization of shareholders' wealth. In case payment of dividend helps the management in achieving this objective, it would be advisable to pay dividends. In case payment of dividend does not help in. achieving this objective, the management would be well advised to retain the profits and use them for financing investment programmes. Thus, the dividend decision is largely based on its impact on the value of the firm.

Theories of Dividend

There are conflicting theories regarding impact of dividend decision on the valuation of a firm. According to one school of thought dividend decision does not affect the shareholders' wealth and so also the valuation of the firm. While according to another school of thought, dividend decision materially affects the shareholders' wealth and also the valuation of the firm. So, from the viewpoints of scholars the following are the two groups:

(1) Irrelevance concept of dividend.
(2) Relevance concept of dividend.

Relevance of Dividends

The school of thought that considers the value of the firm to be dependant on the dividend policy includes two models: Walter's Model and Gordon's Model. Both the models are similar, and make similar assumptions with similar conclusions.

These models of valuation of the firm link the dividend policy to investment opportunities available. These models support the view that dividend policy is material to the value of the firm, and is dependent upon the kind of investment opportunities that are available to the firm in comparison with the expectations of shareholders.

Assuming sufficient business opportunities are available to the firm, and then the dividend policy affecting the firm's value will depend upon the returns that are being offered by these opportunities, compared to the expectations of shareholders. If these business opportunities offer higher returns than the expectations of shareholders, then a dividend policy oriented towards retention of earnings for exploiting new business opportunities will be more rewarding to shareholders than a policy that favours distributing the earnings and forgoing any profitable business opportunities. In such situations, the dividend policy favouring retention of earnings should lead to a larger increase in the value of the firm than the dividend policy favoring distribution of earnings.

On the contrary, if available business opportunities provide a return that is less than the expected return to the shareholders then retention of earnings to finance the new business opportunities will diminish the value of the firm rather than adding to it. In such a situation, distributing earnings to shareholders, rather than retaining them in the business, will be advisable. A dividend policy favouring greater pay out will add more value to the firm.

Walter's Model

Walter's model supports the doctrine that dividends are relevant. The investment policy of a firm cannot be separated from its dividends policy and both are, according to Walter, interlinked. The choice of an appropriate dividend policy affects the value of an enterprise.

The key argument in support of the relevance proposition of Walter's model is the relationship between the return on a firm's investment or its internal rate of return (r) and its cost of capital or the required rate of return (k). The firm would have an optimum dividend policy which will be determined by the relationship of r and k. In other words, if the return on investments exceeds the cost of capital, the firm should retain the earnings, whereas it should distribute the earnings to the shareholders in case the required rate of return exceeds the expected return on the firm's investments, The rationale is that if r> k, the firm is able to earn more than what the shareholder could by reinvesting, if the earnings are paid to them. The implication of r < k is that shareholder can earn a higher return by investing elsewhere.

Walter's model, thus, relates the distribution of dividends (retention of earnings) to available investment opportunities. If a firm has adequate profitable investment opportunities, it will be able to earn more than what the investors expect so that r> k. Such firms may be called growth firm. For growth firms the optimum dividend policy would be given by a D/P ratio of zero. That is to say, firm should plough back the entire earnings within the firm. The market value of the shares will be maximised as a result.

In contrast, if a firm does not have profitable investment opportunities (when r < k), the shareholders will be better off if earnings are paid out to them so as to enable them to earn a higher return by using the funds elsewhere. In such a case, the market price of shares will be maximized by the distribution of the entire earnings as dividends. A D/ P ratio of 100 would give an optimum dividends policy.

Finally when r = k (normal firms), it is a matter of indifference whether earnings are retained or distributed. This is so because for all D /P ratios (ranging between zero and 100) the market price of shares will remain constant. For such firms, there is no optimum dividend policy (D/ P ratio).

$$P = \frac{D + r/k_e(E-D)}{k_e}$$

where
P = Prevailing market price of a share
D = Dividend per share
E = Earning Per Share
r = Rate of return on firm's investment
k_e = Cost of capital

Example 1

The following information is available in respect of a firm:
Capitalisation rate (k_e) = 0.10
Earnings per share (E) = Rs 10
Assumed rate of return on investments(r) : (i) 15, (ii) 8, and (iii) 10.
Show the effect of dividend policy on the market price of shares, using Walter's model.

Solution

(i) When r is 0.15, that is. r> k_e. The effect of different D/ P ratios depicted in Table1.
(ii) When r = 0.08 and 0.10, that is, r< k_e and r =k_e respectively. The effect of different D/P ratios on the value of shares is shown in Table 2.

Dividend Policy and Value of Shares (Walter's Model)

(a) D/P ratio = 0 (Dividend per share = zero)

$$P = \frac{0 + \left[\frac{0.15}{0.10}\right](10 - 0)}{0.10} = \text{Rs}150$$

(b) D/P ratio = 25 (Dividend per share = Rs 2.5)

$$P = \frac{2.5 + \left[\frac{0.15}{0.10}\right](10 - 2.5)}{0.10} = \text{Rs } 137.50$$

(c) D/P ratio = 50 (Dividend per share = Rs 5)

$$P = \frac{5 + \left[\frac{0.15}{0.10}\right](10 - 5)}{0.10} = \text{Rs } 125$$

(d) D/P ratio = 75 (Dividend per share = Rs 7.5)

$$P = \frac{7.5 + \left[\frac{0.15}{0.10}\right](10 - 7.5)}{0.10} = \text{Rs } 112.50$$

(e) D/P ratio = 100 (Dividend per share = Rs 10)

$$P = \frac{10 + \left[\frac{0.15}{0.10}\right](10 - 10)}{0.10} = \text{Rs } 100$$

Table 2

Dividend Policy and Value of Shares (Walter's Model)

	(A) r = 0.8 (r < k_e)	*(B) r = 0.10 (r = k_e)*
(a) D/P ratio = Zero	$P = \frac{0 + \left[\frac{0.08}{0.10}\right](10 - 0)}{0.10} = \text{Rs } 80$	$P = \frac{0 + \left[\frac{0.10}{0.10}\right](10 - 0)}{0.10} = \text{Rs } 100$
(b) D/P Ratio = 25	$P = \frac{2.5 + \left[\frac{0.08}{0.10}\right](10 - 2.5)}{0.10} = \text{Rs } 85$	$P = \frac{2.5 + \left[\frac{0.10}{0.10}\right](10 - 2.5)}{0.10} = \text{Rs } 100$

(c) D/P Ratio = 50

$$P = \frac{5 + \left[\frac{0.08}{0.10}\right](10-5)}{0.10} = \text{Rs } 90 \qquad P = \frac{5 + \left[\frac{0.10}{0.10}\right](10-5)}{0.10} = \text{Rs } 100$$

(d) D/P Ratio = 75

$$P = \frac{7.5 + \left[\frac{0.08}{0.10}\right](10-7.5)}{0.10} = \text{Rs } 95 \qquad P = \frac{7.5 + \left[\frac{0.10}{0.10}\right](10-7.5)}{0.10} \text{ Rs } 100$$

(e) D/P Ratio = 100

$$P = \frac{10 + \left[\frac{0.08}{0.10}\right](10-10)}{0.10} = \text{Rs } 100 \qquad P = \frac{10 + \left[\frac{0.10}{0.10}\right](10-10)}{0.10} = \text{Rs } 100$$

Assumptions and Limitations

In the above analysis, we have made following assumptions which are also the limitations of the model:

1. Funding of new projects is done solely from earnings. Issuing fresh equity or raising debt to fund the growth is not considered. In reality, this is rarely the case, as most firm resort to outside financing at some point of time. However, this assumption is necessary to highlight the impact of the dividend policy on the value of the firm. Based on this assumption alone the conclusions made will be unaffected even if some amount of external funding, either through equity or through borrowing, is used to fund the growth.
2. Growth opportunities do not alter the risk profile of the firm as a whole, and therefore, the market capitalization rate remains constant. This assumption too holds in the normal course, as most firms engage in diversification projects in fields that are related. Furthermore, each of the diversification projects is comparatively small, relative to the size of the firm. Under such circumstances, the risk profile undergoes a change that is gradual; therefore, the conclusions made will be true for the reasonably foreseeable future. However, such conclusions may not hold true from a long-term viewpoint, as the risk profile may change substantially over longer periods; they may also not hold true if the firm undertakes a diversification plan that is unrelated, or is too big compared to the current level of operations.
3. The firm is a going concern and the pricing model assumes perpetual earnings. This assumption too seems reasonable; the effects of distant cash flows on the price of shares in the valuation model are minimal, as they are discounted. A change in the cash flow for the next year has a far greater impact on prices than the cash flow of tenth year.
4. Lastly, there is an implied assumption that the reinvestment rate r remains constant. Normally, all available projects do not have the same rate of return. Different projects have different rates of return, and the firm chooses projects in descending order—first accepting the project with the highest rate of return—and keeps choosing projects till funds are available, or any other constraint is faced. However, as long as the assumptions of comparative values of reinvestment rate and market capitalization rate hold well, the conclusions made about the impact on prices would remain valid.

According to Walter's Model, the capital budgeting decision and dividend decision are interrelated. The capital budgeting policy determines the value of dividend policy becomes a key determinant of the value of the firm because it will materially affect the capital budgeting process.

Conclusions of Walter's Model

As is evident from the example, the key determinant of the dividend policy and value of the firm is the reinvestment rate of retained earnings. The following observations can be made

(a) For a growing firm, the market value will (i) increase if dividend pay out ratio is decreased and (ii) decrease if dividends pay out is increased. This is because shareholders on their own can not earn more on the distributed earnings than the firm would with the money retained. Therefore, a 0% pay out would maximize the share price of the firm.

(b) For a declining firm, the opposite will happen. Here, the shareholders can earn more on distributed earnings than the firm can provide from retained earnings. A dividend policy of 100% pay out will maximize the value of the firm.

(c) However, for a normal firm, investors are indifferent to the dividend policy because retained earnings will yield the same return as distributed earnings. Therefore, the share price for such a firm remains constant, and the dividend policy becomes irrelevant.

Gorden Model

The dividends of most companies are expected to grow and evaluation of value shares based on dividend growth is often used in valuation of shares. Dividend valuation model assumes a constant level of growth in dividends in perpetuity. The Gordon growth model is a theoretical model used to value ordinary equity shares. The model incorporates the retention of earnings and growth of dividends and hence it is also called as 'dividend growtth valuation model'. The main proposition of the model is that the value of a share reflects the value of the future dividends accruing to that share. Hence, the dividend payments and its growth are relevant in valuation shares. The model holds that share's market price is equal to the sum of share's discounted future dividend payments.

Assumptions - Gordon growth valuation model using dividend capitalization is based on the following assumptions:

(a) The firm is an all-equity firm and has no debt.
(b) External financing is not used in the firm. Retained earnings represent the only source financing.
(c) The internal rate of return is the firm's cost of capital 'k'. It remains constant and is taken as the appropriate discount rate.
(d) Future annual growth rate dividend is expected to be constant.
(e) Growth rate of the firm is the product of retention ratio and its rate of return.
(f) Cost of capital is always greater than the growth rate.
(g) The company has perpetual life and the streams of earnings are perpetual.
(h) Corporate taxes do not exist.
(i) The retention ratio 'b' once decided upon, remains constant. Therefore, the growth rate g = br, is also constant foreever.

Gordon's model of dividend relevance is also described as a bird-in the hand argument. That a bird in hand is better than two in the bush is based on the logic that what is available at present is preferable to what may be available in the future. Basing his model on this argument, Gordon argues that the future is uncertain and the more distant the future is, the more uncertain it is likely to be. If, therefore, current dividends are withheld to retain profits, whether the investors would at all receive them later is uncertain. Investors would naturally like to avoid uncertainty. In fact, they would be inclined to pay a higher price for shares on which current dividends are paid. Conversely, they would discount the value of shares of a firm which postpones dividends.

In valuation of share under Gordon growth model, the shareholders required rate of return (k_e) can be calculated by using the capital asset pricing Model. The model requires the estimation of future growth of dividends. The Gordon growth Model using dividend capitalization can be presented as follows:

$$P_0 = \frac{E_1 (1 - b)}{K_e - br}$$

where

P_0 = Current ex-dividend market price of equity share

E_1 = Expected earnings per share

b = Retention ratio

(1- b) Dividend payout ratio

K_e = Cost of capital or Capitalization rate

br = g = Growth rate of earnings and dividends

Example 2

The following information is available in respect of the rate of return on investment (r), the capitalisation rate (k_e,) and earnings per share (E) of Hypothetical Ltd.

r = 12%

E= Rs20

Determine the value of its shares, assuming the following:

	D/P ratio (1 – b)	*Retention ratio (b)*	*k_e (%)*
(a)	10	90	20
(b)	20	80	19
(c)	30	70	18
(d)	40	60	17
(e)	50	50	16
(f)	60	40	15
(g)	70	30	14

Solution: The value of share of Hypothetical Ltd for different D/P and retention ratio is depicted in Table 3

Table 3

(a) D/P ratio 10
Retention ratio 90

$br(g) = 0.9 \times 0.12 = 0.108$

$$P = \frac{\text{Rs } 20\,(1-0.9)}{0.20-0.108} = \frac{\text{Rs } 2}{0.092} = \text{Rs } 21.74$$

(b) D/P ratio 20
Retention ratio 80

$br = 0.8 \times 0.12 = 0.096$

$$P = \frac{\text{Rs } 20\,(1-0.8)}{0.19-0.096} = \text{Rs } 42.55$$

(c) D/P ratio 30
Retention ratio 70

$br = 0.7 \times 0.12 = 0.084$

$$P = \frac{\text{Rs } 20\,(1-0.7)}{0.18-0.084} = \text{Rs } 62.50$$

(d) D/P ratio 40
Retention ratio 60

$br = 0.6 \times 0.12 = 0.72$

$$P = \frac{\text{Rs } 20\,(1-0.6)}{0.17-0.072} = \text{Rs } 81.63$$

(e) D/P ratio 50
Retention ratio 50

$br = 0.5 \times 0.12 = 0.060$

$$P = \frac{\text{Rs } 20\,(1-0.6)}{0.17-0.072} = \text{Rs } 100$$

(f) D/P ratio 60
Retention ratio 40

$br = 0.4 \times 0.12 = 0.048$

$$P = \frac{\text{Rs } 20\,(1-0.4)}{0.15-0.048} = \text{Rs } 117.65$$

(g) D/P ratio 70
Retention ratio 30

$br = 0.3 \times 0.12 = 0.036$

$$P = \frac{\text{Rs } 20\,(1-0.3)}{0.14-0.036} = \text{Rs } 134.62$$

The Gorden growth model assumes that a constant retention ratio and a constant return on new investment in projects. If these assumptions hold, both earnings and dividends grow at the same rate. The Gordon growth model used to show that the value of a company ultimately depends on its paying capacity.

The implication of the model is that when the rate of return is greater then discount rate, the price per share increases as the dividend ratio decreases and if the return is less than discount rate it is vice versa. The price per share remains unchanged where the rate of return and discount rate are equal. In fact some companies, although earning profits, elect not to pay dividends. This is a matter of deliberate financial policy, not a measure forced upon them by financial difficulties. The above theory of share valuation can still be applied to these companies, since one day presumably they will start paying dividends. This is the only basis on which shareholders can obtain any returns from the company . The reason the price of shares rises is that with retention policies of the company, the rapid growth alters investors' expectations about future size of dividends. At some time in the future, large dividends can be paid. So once again it can be said that dividends determine the company's share price.

Criticism:

The Gordon Growth Model is criticized for the following reasons:

-In real world, the constant dividend growth and earnings growth is a fallacy.

- The model implies that if 'D_o is zero, the value of share is nil.

- The capital gains are ignored by the model.

- The false assumption is that investors will buy and hold the shares for an infinite period of time.

- The model ignores the allowance for corporate and personal taxation.

-The diminishing marginal efficiency of investment is ignored.

-The effect of change in the firm's risk-class and its effect on firm's cost of capital is ignored.

Irrelevance of Dividends

The crux of the argument supporting the irrelevance of dividends to valuation is that the dividend policy of a firm is a part of its financing decision. As a part of the financing decision the dividend policy of the firm is a residual decision and dividends are a passive residual. If dividend policy is strictly a financing decision, whether dividends are paid out of profits, or earnings are retained, will depend upon the available investment opportunities. It implies that when a firm has sufficient investment opportunities, it will retain the earnings to finance them.

Conversely, if acceptable investment opportunities are inadequate, the implication is that the earnings would be distributed to the shareholders. The test of adequate acceptable investment opportunities is the relationship between the return on the investments (r) and the cost of capital (k). As long as r exceeds k, a firm has acceptable investment opportunities. In other words, if a firm can earn a return (r) higher than its cost of capital (k), it will retain the earnings to finance investment projects. If the retained earnings fall short of the total funds required it will raise external funds—both equity and debt—to make up the shortfall. If, however, the retained earnings exceed the requirements of funds to finance acceptable investment opportunities, the excess earnings would be distributed to the shareholders in the form of cash dividends. The amount of dividend will fluctuate from year to year depending upon the availability of acceptable investment opportunities. With abundant opportunities, the dividend payout ratio (D/P ratio, that is, the ratio of dividends to net earnings) would be zero. When there are no profitable opportunities, the D/P ratio will be 100. For situations between these extremes, the D/P ratio will range between zero and 100.

That dividends are irrelevant, or are a passive residual, is based on the assumption that the investors are indifferent between dividends and capital gains. So long as the firm is able to earn more than the equity-capitalisation rate (k_e), the investors would be content with the firm retaining the earnings. In contrast, if the return is less than the ke, investors would prefer to receive the earnings (i.e. dividends).

Modigliani and Miller Hypothesis

The most comprehensive argument in support of the irrelevance of dividends is provided by the MM hypothesis. Modigliani and Miller maintain that dividend policy has no effect on the share price of the firm and is, therefore, of no consequence. What matters, according to them, is the investment policy through which the firm can increase its earnings and thereby the value of the firm. Given the investment decision of the firm, the dividend decision—splitting the earnings into packages of retentions and dividends—is a matter of detail and does not matter. 'Under conditions of perfect capital markets, rational investors, absence of tax discrimination between

dividend income and capital appreciation, given the firm's investment policy, its dividend policy may have no influence on the market price of shares.'

Assumptions

The MM hypothesis of irrelevance of dividends is based on the following critical assumptions:

1. Perfect capital markets in which all investors are rational. Information is available to a free of cost, there are no transactions costs; securities are infinitely divisible; no investor is large enough to influence the market price of securities; there are no flotation costs.
2. There are no taxes. Alternatively, there are no differences in tax rates applicable to capital gains and dividends.
3. A firm has a given investment policy which does not change. The operational implication of this assumption is that financing of new investments out of retained earnings will not change the business risk complexion of the firm and, therefore, there would be no change in the required rate of return.
4. There is a perfect certainty by every investor as to future investments and profits of the firm. In other words, investors are able to forecast future prices and dividends with certainty. This assumption is dropped by MM later.

The crux of the MM position on the irrelevance of dividend is the arbitrage argument. The arbitrage process involves a switching and balancing operation. In other words, arbitrage refers to entering simultaneously into two transactions which exactly balance or completely offset each other. The two transactions here are the acts of paying out dividends and raising external funds—either through the sale of new shares or raising additional loans—to finance investment programmes. Assume that a firm has some investment opportunity. Given its investment decision, the firm has two alternatives: (i) it can retain its earnings to finance the investment programme (ii) or distribute the earnings to the shareholders as dividend and raise an equal amount externally through the sale of new shares/bonds for the purpose. If the firm selects the second alternative, arbitrage process is involved, in that payment of dividends is associated with raising funds through other means of financing. The effect of dividend payment on shareholders' wealth will be exactly offset by the effect of raising additional share capital.

When dividends are paid to the shareholders, the market price of the shares will decrease. What is gained by the investors as a result of increased dividends will be neutralised completely by the reduction in the terminal value of the shares. The market price before and after the payment of dividend would be identical. The investors, according to Modigliani and Miller, would, therefore, be indifferent between dividend and retention of earnings. Since the shareholders are indifferent, the wealth would not be affected by current and future dividend decisions of the firm. It would depend entirely upon the expected future earnings of the firm.

There would be no difference to the validity of the MM premise, if external funds are raised in the form of debt instead of equity capital. This is because of their indifference between debt and equity with respect to leverage. The cost of capital is independent of leverage and the real cost of debt is the same as the real cost of equity.

That investors are indifferent between dividend and retained earnings implies that the dividend decision is irrelevant. The arbitrage process also implies that the total market value plus current dividends of two firms which are alike in all respects except D/P ratio will be identical. The individual shareholder can retain and invest his own earnings as well as the firm would.

With dividends being irrelevant, a firm's cost of capital would be independent of its D/P ratio.

Finally, the arbitrage process will ensure that under conditions of uncertainty also the dividend policy would be irrelevant. When two firms are similar in respect of business risk, prospective future earnings and investment policies, the market price of their shares must be the same. This, MM argue, is because of the rational behaviour of investors who are assumed to prefer more

wealth to less wealth. Differences in current and future dividend policies cannot affect the market value of two firms as the present value of prospective dividends plus terminal value is the same.

Proof for MM Hypothesis

According to MM hypothesis, the market value of a share in the beginning of the period is equal to the present value of dividends paid at the end of the period plus the market price of the share at the end of the period. This can be put in the form of the following equation:

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

where

Po = Prevailing market price of a share

Ke = Cost of equity capital

D_1= Dividend to be received at the end of period one

P_1 = Market price of a share at the end of period one.

From the above equation the following equation can be derived for determining the value of P_1.

$$P_1 = P_o (1 + Ke) - D_1$$

Computation of number of new shares to be issued

The investment programme of a firm in a given period of time can be financed either by retained earnings or by issue of new shares or both. The number of new shares to be issued can be determined by the following equation:

$$m \times P_1 = I - (X - {}_nD_1)$$

where

m = Number of new shares to be issued

P_1 = Price at which new issue is to be made

I = Amount of investment required

X = Total net profit of the firm during the period

${}_nD_1$= Total dividends paid during the period.

Example 3

The present share capital of A Ltd. consists of 1,000 shares selling at Rs. 100 each. The company is contemplating a dividend of Rs. 10 per share at the end of the current financial year. The company belongs to a risk class for which appropriate capitalisation rate is 20%. The company expects to have a net income of Rs. 25,000. What will be the price of the 'share at the end of the year if (i) dividend is not declared, and (ii) a dividend is declared? Presuming that the company pays the dividend and has to make new investment of Rs. 48,000 in the coming period, how many new shares be issued to finance the investment programme? You are required to use the MM model for this purpose.

Solution:

The price of the share at the end of current financial year can be ascertained by the following equation:

$$P_1 = P_0 (1 + Ke) - D_1$$

where

Ke = Cost of equity capital

D_1= Dividend to be received at the end of financial year

P_1 = Market price of a share at the end of at the end of financial year.

Substituting the values in the above equation, the value of a share of A Ltd. at the end of the current financial year can be ascertained as follows:

When dividend is not paid

P = Rs. 100(1+.20) - 0
= 100 x 1.20
= Rs 120

When dividend is paid

P = Rs. 100(1+.20) – Rs10
= Rs.110.
= Rs.110.

From the above it is clear that whether dividend is paid or not, the wealth of the shareholders remains equal. When the dividend is not paid, the shareholders can realise Rs. 120 per share. In case dividend is paid, the shareholder gets Rs. 10 as dividend and can realise further Rs. 110. Thus, the total realisation amounts to Rs. 120 as is the case when dividend is not paid.

Number of new shares to be issued:

$$m \times P_1 = I - (X - nD_1)$$

m x 110= 48,000- (25,000- 10,000)
110m =33,000
m = 3,000.

Example 4

A chemical company belongs to a risk class for which the appropriate P/E ratio is 10. It currently has 50,000 equity shares (outstanding) selling at Rs. 100 each. The firm is contemplating the declaration of dividend of Rs. 8 per share at the end of current fiscal year which has just started. Given the assumptions of Modigliani and Miller, answer the following questions:

(i) What will be the price of the share at the end of the year (a) if dividend is not declared; and (b) if it is declared?

(ii) Assuming that the company pays the dividend, has a net income (Y) of Rs. 5, 00,000 and makes new investments of Ps. 10, 00,000 during the period, how many new shares must be issued?

Solution: (i) Price of share

(i) (a) Price of a share when dividend is not declared

$$P_0 = \frac{D_1 + P_1}{(1 + Ke^*)} \text{ or Rs. } 100 = \frac{0 + P_1}{(1 + 0.1)} \text{ or } P_1 = 110$$

$$Ke^* = \frac{1}{P/E \text{ Ratio}} = \frac{1}{10} \times 100 = 10\%$$

(b) Price of a share when dividend is declared

$$\text{Rs. } 100 = \frac{\text{Rs. } 8 + P_1}{\text{Rs. } 1.10} \text{ or Rs. } 110 = \text{Rs. } 8 + P_1 \text{ or } P_1 = \text{Rs. } 102$$

(ii) Amount required for new financing

$$m \times P_1 = I - (X - {}_nD_1)$$

where

m = number of new shares to be issued.

P = Price at which new Issue is to be made.

I = Amount of investment required.

x = Total net profit of the firm during the period.

${}_nD_1$ = Total dividends paid during the period.

On putting values given in the question in above equation, we get

102m = Rs. 10, 00,000- (Rs. 5, 00,000 - Rs. 4, 00,000) = Rs. 9, 00,000

New Shares (m) = [9, 00,000/102] = 8,823.52 shares or 8,824 shares.

Criticism of Modigliani and Miller

The MM argues that the dividend decision of the firm is irrelevant in the sense that the value of the firm is independent of it. The crux of their argument is that the investors are indifferent between dividend and retention of earnings. This is mainly because of the balancing nature of internal financing (retained earnings) and external financing (raising of funds externally) consequent upon distribution of earnings to finance investment programmes. Whether the MM hypothesis provides a satisfactory framework for the theoretical relationship between dividend decision and valuation will depend, in the ultimate analysis, on whether external and internal financing really balance each other. This, in turn, depends upon the critical assumptions stipulated by them. Their conclusions, it may be noted, under the restrictive assumptions, are logically consistent and intuitively appealing. But these assumptions are unrealistic and untenable in practice. As a result, the conclusion that dividend payments and other methods of financing exactly offset each other and, hence, the irrelevance of dividends, is not a practical proposition; it is merely of theoretical relevance. The validity of the MM Approach is open to question on following grounds:

Modigliani and Miller assume that capital markets are perfect. This implies that there are no taxes; flotation costs do not exist and there is absence of transaction costs. These assumptions are untenable in actual situations.

Tax Effect: An assumption of the MM hypothesis is that there are no taxes. It implies that retention of earnings (internal financing) and payment of dividends (external financing) are, from the viewpoint of tax treatment, on an equal footing. The investors would find both forms of

financing equally desirable. The tax liability of the investors, broadly speaking, is of two types: (i) tax on dividend income, and (ii) capital gains. While the first type of tax is payable by the investors when the firm pays dividends, the capital gains tax is related to retention of earnings. From an operational viewpoint, capital gains tax is (i) lower than the tax on dividend income and (ii) it becomes payable only when shares are actually sold, that is, it is a deferred tax till the actual sale of the shares. The types of taxes, corresponding to the two forms of financing, are different, although the MM position would imply otherwise. The different tax treatment of dividend and capital gains means that with the retention of earnings the shareholders' tax liability would be lower or there would be tax saving for the shareholders.

Flotation Costs: Another assumption of a perfect capital market underlying the MM hypothesis is dividend irrelevance is the absence of flotation costs. The term 'Flotation cost' refers to the cost involved in raising capital from the market, for instance, underwriting commission, brokerage and other expenses. The presence of flotation costs affects the balancing nature of internal (retained earnings) and external (dividend payments) financing. The MM position, it may be recalled, argues that given the investment decision of the firm, external funds would have to be raised, equal to the amount of dividend, through the sale of new shares to finance the investment programme. The two methods of financing are not perfect substitutes because of flotation costs.

The introduction of such costs implies that the net proceeds from the sale of new shares would be less than the face value of the shares, depending upon their size. It means that to be able to make use of external funds, equivalent to the dividend payments, the firm would have to sell shares for an amount in excess of retained earnings. In other words, external financing through sale of shares would be costlier than internal financing via retained earnings. The smaller the size of the issue, the greater is the percentage flotation cost. To illustrate, suppose the cost of flotation is 10 per cent and the retained earnings are Rs 900. In case dividends are paid, the firm will have to sell shares worth Rs 1,000 to raise funds equivalent to the retained earnings. That external financing is costlier is another way of saying that firms would prefer to retain earnings rather than pay dividends and then raise funds externally.

Transaction and Inconvenience Costs: Yet another assumption which is open to question is that there are no transaction costs in the capital market. Transaction costs refer to costs associated with the sale of securities by the shareholder-investors. The no-transaction costs postulate implies that if dividends are not paid (or earnings are retained),the investors desirous of current income to meet consumption needs can sell a part of their holdings without incurring any cost, like broker age and so on. This is obviously an unrealistic assumption.

Institutional Restrictions: The dividend alternative is also supported by legal restrictions as to the type of ordinary shares in which certain investors can invest. For instance, the life insurance companies are permitted in terms of section 27-A (1) of the Insurance Act, 1938, to invest in only such equity shares on which a dividend of not less than 4 per cent including bonus has been paid for 7 years or for at least 7 out of 8 or 9 years immediately preceding. To be eligible for institutional investment, the companies should pay dividends. These legal impediments, therefore, favour dividends to retention of earnings. A variation of the legal requirement to pay dividends is to be found in the case of mutual funds. They are required in terms of the stipulations governing their operations, to distribute at least 90 per cent of its net income to investors. The point is that the eligible securities for investment by the mutual funds are assumed to be those that are on the dividend-paying list.

Near Vs Distant Dividend: One aspect of the uncertainty situation is the payment of dividend now or at a later date. If the earnings are used to pay dividends to the investors, they get 'immediate' or 'near' dividend. If, however, the net earnings are retained, the shareholders would be entitled to receive a return after some time in the form of an increase in the price of shares (capital gains) or bonus shares and so on. The -dividends may, then, be referred to as 'distant' or 'future' dividends. The crux of the problem is: are the investors indifferent between immediate and future dividends? Or would they prefer one over the other? According to Gordon investors are not indifferent; rather, they would prefer near dividend to distant dividend. The payment of dividend is uncertain, how much dividend and when it would be paid by the firm to the investors cannot be precisely forecast. The longer the distance in future dividend payment, the higher is the uncertainty to the shareholders. The uncertainty increases the risk of the investors. The payment of dividend is not associated with any such uncertainty. In other words, payment of immediate dividend resolves uncertainty. The argument that near dividend implies resolution of uncertainty is referred to as the 'bird-in-hand' argument In brief, since current dividends are less risky than future/distant dividends, shareholders would favour dividends to retained earnings.

Suggested Reading

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Lesson 8

Determinants of Dividend

The main objective of a firm is to maximize wealth of its owners i.e., shareholders. Cash inflows are generated from the successful operation of business which is used for payment of dividends to its shareholders. Dividend paid represents a cash outflow which depletes the cash resources. The dividend decision is regarded as a financing decision since any cash dividend paid reduces the amount of cash available for investment by the firm. Dividends are periodic cash payments by the company to its shareholders. The dividend payable to the preference shareholders is usually fixed by the terms of the issue of preference shares. But the dividend on equity shares is payable at the discretion of the Board of Directors of the company. For payment of dividends, a company must earn distributable profits from which the actual payment of dividends will be made. Dividend policy is contemporary to retention policy. Retentions are used to finance capital projects and redeem shares and debentures.

Dividends may be defined as divisible profit distributed amongst the members of a company in proportion to their shares in such a manner as is prescribed by the Memorandum and Articles of Association of the company.
A dividend is a share of profit of the company divided among its shareholders. A company in general meeting may declare dividend but no dividend shall exceed the amount recommended by the Board.

The following are some important dates relating to dividend
a) The dividend payments may be interim or final. The date on which the announcement is made of new dividend is called 'dividend declaration date'.
(b) The dividend payment will he made to the members whose names appear in the Register of Members on a particular date is called 'record date'.
(c) The date from which the stock begins to trade without the right to receive the dividend declared is called 'ex-dividend date'.
(d) The date on which the company actually mails the dividend warrants is called 'payment date'.

Types of Dividend

Dividends are of three types

(i) Interim dividend,
(ii) Final dividend and
(iii) Preference dividend.

Interim Dividend - An interim dividend is one which is declared before the declaration of the final dividend. Interim dividend is a dividend which is declared between two annual general meetings. The Board of Directors may from time to time pay to the members such interim dividend as appears to it to be justified by the profits of the company. The directors must take into consideration the future prospects of the profits e.g., orders in hand, any seasonal element in business before declaration of interim dividend otherwise it may be considered payment out of capital. Cash resources, likelihood profitability of the company must also be taken into consideration while deciding to declare an interim dividend.

Final Dividend - At the end of the accounting period, the accounts of the company are prepared to ascertain the amount of profit earned by the company. The directors, taking into consideration the financial position of the company's future prospects, provision for resources, etc., decide to recommend to the shareholders at the annual general meeting the dividend to be paid to the shareholders.

Preference Dividend: The articles of association of a company empower the directors to declare and pay both interim and final dividend on preference shares. Holders of preference shares are entitled to receive dividend before any dividend is paid to the equity shareholders as per the terms of the issue.

Form of Dividends

Dividends can be classified into different categories depending upon the form in which they are paid. The various forms of dividends are a follows:

1. **Cash Dividend:** The usual practice is to pay dividends in cash. Payment of dividends in cash results in outflow of funds from the firm. The firm should, therefore, have adequate cash resources at its disposal or provide for such resources so that its liquidity position is not adversely affected on account of distribution of dividends in cash.

2. **Bond Dividend:** In case the company does not have sufficient funds to pay dividend in cash it may issue bonds for the amount due to the shareholders by way of dividends. The purpose of bond dividend is postponement of payment of immediate dividend in cash. The bond holders get regular interest on their bonds besides payment of the bond money on the due date. Bond dividend is not popular in India.

3. **Property dividend**: In case of such dividend the company pays dividend in the form of assets other than cash. This may be in the form of certain assets which are not required by the company or in the form of company's products. This type of dividend is also not popular in India.

4. **Stock Dividend**: Stock dividend is next to cash dividend in respect of its popularity. In case of this form of dividend, the company issues its own shares to the existing shareholders in lieu or in addition to cash dividend. Payment of stock dividend is popularly termed as "issue of bonus shares" in India

Factors Affecting Dividend

There are number of factors affecting the dividend policy of the company. Some of the factors are internal to the company while others are external to the organization. The detail of each factor is given below.

Dividend Payout (D/P) Ratio

A major aspect of the dividend policy of a firm is its dividend payout (D/P) ratio, that is, the percentage share of the net earnings distributed to the shareholders as dividends.
Dividend policy involves the decision to pay out earnings or to retain them for reinvestment in the firm. The retained earnings constitute a source of financing. The payment of dividends results in the reduction of cash and, therefore, in a depletion of total assets. In order to maintain the asset

level, as well as to finance investment opportunities, the firm must obtain funds from the issue of additional equity or debt. If the firm is unable to raise external funds, its growth would be affected. Thus, dividends imply outflow of cash and lower future growth. In other words, the dividend policy of the firm affects both the shareholders' wealth and the long-term growth of the firm. The optimum dividend policy should strike the balance between current dividends and future growth which maximizes the price of the firm's shares.'

The D/P ratio of a firm should be determined with reference to two basic objectives—maximizing the wealth of the firm's owners and providing sufficient funds to finance growth. These objectives are not mutually exclusive, but interrelated.

Given the objective of wealth maximization, the firm's dividend policy (D/P ratio) should be one which can maximize the wealth of its owners in the 'long run'. In theory, it can be expected that the shareholders take into account the long-run effects of D/P ratio, that is, if the firm is paying low dividends and having high retentions, they recognise the element of growth in the level of future earnings of the firm. However, in practice they have a clear cut preference for dividends because of uncertainty and imperfect capital markets. The payment of dividends can, therefore, be expected to affect the price of shares: a low D/P ratio may cause a decline in share prices, while a high ratio may lead to a rise in the market price of the shares.

Making a sufficient provision for financing growth can he considered a secondary objective of dividend policy. Without adequate funds to implement acceptable projects, the objective of wealth maximization cannot be achieved. The firm must forecast its future needs for funds, and taking into account the external availability of funds and certain market considerations, determine both the amount of retained earnings needed and the amount of retained earnings available after the minimum dividends have been paid. Thus, dividend payments should not he viewed as a residual, but rather a required outlay after which any remaining funds can be reinvested in the firm.

Stability of Dividends

The second major aspect of the dividend policy of a firm is the stability of dividends. The investors favour a stable dividend as much as they favour the payment of dividends (D/P ratio).

The term dividend stability refers to the consistency or lack of variability in the stream of dividends. In more precise terms it means that a certain minimum amount of dividend is paid out regularly. The stability of dividends can take any of the following three forms: constant dividend per share, constant D/P ratio, and constant dividend per share plus extra dividend.

Constant Dividend per Share: According to this form of stable dividend policy a company follows a policy of paying a certain fixed amount per share as dividend. For instance on a share of face value of Rs 100 a firm may pay a fixed amount of say Rs 15 as dividend. This amount would be paid year after year, irrespective of the level of earnings. In other words fluctuations in earnings would not affect the dividend payments. In fact, when a company follows such a dividend policy, it will pay dividends to the shareholder even when it suffers losses. A stable dividend policy in terms of a fixed amount of dividend per share does not, however, mean that the amount of dividend is fixed for all times to come. The dividends per share are increased over the years when the earnings of the firm increase and it is expected that the new level of earnings can be maintained. Of course, if the increase is expected to be temporary, the annual dividend remains at the existing level.

To be able to pursue such a policy, a firm whose earnings are not stable would have to make provisions in years when earnings are higher for payment of dividends in lean years. Such firms usually create a reserve for dividends equalisation. The balance standing in this fund is normally invested in such assets as can be readily converted into cash.

Constant Payout Ratio: With constant payout ratio, a firm pays a constant percentage of net earnings as dividend to the shareholders. In other words, a stable dividend payout ratio implies that the percentage of earnings paid out each year is fixed. Accordingly, dividends would fluctuate proportionately with earnings and are likely to be highly volatile in the wake of wide fluctuations in the earnings of the company. As a result, when the earnings of a firm decline substantially or there is a loss in a given period, the dividends, according to the target payout ratio, would be low or nil. To illustrate, if a firm has a policy of 50 per cent target payout ratios, its dividends will range between Rs 5 and zero per share on the assumption that the earnings per share are Rs 10 and zero respectively.

Stable Rupee Dividend plus Extra Dividend: Under this policy, a firm usually pays a fixed dividend to the shareholders and in years of marked prosperity, additional or extra dividend is paid over and above the regular dividend. As soon as normal conditions return, the firm cuts the extra dividend and pays the normal dividend per share.

There are various reasons which support the stable dividend policy. The following are some reasons supporting the stable dividend policy.

Desire for Current Income: A factor favouring a stable policy is the desire for current income by some investors. Investors such as retired persons and widows, for example, view dividends as a source of funds to meet their current living expenses. Such expenses are fairly constant from period to period. Therefore, a fall in dividend will necessitate selling shares to obtain funds to meet current expenses and, conversely, reinvestment of some of the dividend income if dividends rise significantly. For one thing, many of the income-conscious investors may not like to 'dip into their principal' for current consumption. Moreover, either of the alternatives involves, inconvenience apart, transaction costs in terms of brokerage, and other expenses. These costs are avoided if the dividend stream is stable and predictable. Obviously, such a group of investors may be willing to pay a higher share price to avoid the inconvenience of erratic dividend payments which disrupt their budgeting. They would place positive utility on stable dividends.

Informational Contents: Another reason for pursuing a stable dividend policy is that investors are thought to use dividends and changes in dividends as a source of information about the firm's profitability. If investors know that the firm will change dividends only if the management foresees a permanent earnings change, then the level of dividends informs investors about the company's expected earnings. Accordingly, the market views the changes in the dividends of such a company as of a semi-permanent nature. A cut in dividend implies poor earnings expectation; no change, implies earnings stability; and a dividend increase, signifies the management's optimism about earnings. On the other hand, a company that pursues an erratic dividend payout policy does not provide any such information, thereby increasing the risk associated with the shares. Stability of dividends, where such dividends are based upon long-run earning power of the company, is, therefore, a means of reducing share-riskiness and consequently increasing share value to investors.

Requirements of Institutional Investors: A third factor encouraging stable dividend policy is the requirement of institutional investors like life insurance companies, general insurance companies, mutual funds and so on, to invest in companies which have a record of continuous and stable dividend. These financial institutions owing to the large size of their investible funds, represent a significant force in the financial markets and their demand for the company's securities can have an enhancing effect on its price and, thereby, on the shareholder's wealth. A stable dividend policy is a prerequisite to attract the investible funds of these institutions. One consequential impact of the purchase of shares by them is that there may be an increase in the general demand for the company's shares. Decreased marketability risk, coupled with decreased financial risk, will have a positive effect on the value of the firm's shares.

Legal, Contractual, and Internal Constraints and Restrictions

The dividend decision is also affected by certain legal, contractual, and internal requirements and constraints. The legal factors stem from certain statutory requirements, the contractual restrictions arise from certain loan covenants and the internal constraints are the result of the firm's liquidity position.

Legal Requirements Legal stipulations do not require a dividend declaration but they specify the conditions under which dividends must be paid. Such conditions pertain to (i) capital impairment, (ii) net profits and (iii) insolvency.

Capital Impairment Rules: Legal enactments limit the amount of cash dividends that a firm may pay. A firm cannot pay dividends out of its paid-up capital; otherwise there would be a reduction in the capital adversely affecting the security of its lenders. The rationale of this rule lies in protecting the claims of preference shareholders and creditors on the firm's assets by providing a sufficient equity base since the creditors have originally relied upon such an equity base while extending credit. Any dividends that impair capital are illegal and the directors are personally held liable for the amount of illegal dividend. Therefore, the financial manager should keep in mind that payment of dividend is in order and does not violate capital impairment rules.

Net Profits: The net profits requirement is essentially a corollary of the capital impairment requirement; in that it restricts the dividend to be paid out of the firm's current profits plus past accumulated retained earnings. Alternatively, a firm cannot pay cash dividends greater than the amount of current profits plus the accumulated balance of retained earnings. For instance, section 205 of the Indian Companies Act provides that dividends shall be paid only out of the current profits or past profits after providing for depreciation. The point to be recognised is that the company can count on the profits of previous years, if the current year's profits fall short of the required funds for maintaining a desired stable dividend policy. Likewise, if there are past accumulated losses, they should be first set off against current earnings before the payment of dividend.

Insolvency: A firm is said to be insolvent in two situations: first, when its liabilities exceed the assets; and second, when it is unable to pay its bills. If the firm is currently insolvent in either sense, it is prohibited from paying dividends. Similarly, a firm would not pay dividends if such a payment leads to insolvency of either type. The rationale of the rule is to protect the creditors by prohibiting the liquidation of near-bankrupt firms through cash dividend payments to the equity owners.

Contractual Requirements: Important restrictions on the payment of dividend may be accepted by a company when obtaining external capital either by a loan agreement, a debenture indenture, a preference share agreement, or a lease contract. Such restrictions may cause the firm to restrict the payment of cash dividends until a certain level of earnings has been achieved or limit the amount of dividends paid to a certain amount or percentage of earnings. Since the payment of dividend involves a cash outflow, firms are forced to reinvest the retained earnings within the firm. The restriction on dividends may take three forms. In the first place, firms may be prohibited from paying dividends in excess of a certain percentage, say, 12 per cent. Alternatively, a ceiling in terms of the maximum amount of profits that may be used for dividend payment may be laid down, say not more than 60 per cent of the net profits, or a given absolute amount of such profits can be paid as dividends. Finally dividends may be restricted by insisting upon a minimum of earnings to be retained. Reinvestment leads to a lower debt, equity ratio and, thus, enhances the margin of cushion (safety) for the lenders. Therefore, contractual constraints on dividend payments are quite common. The payment of cash dividend in violation of a restriction would amount to default in the case of a loan and the entire principal would become due and payable. Keeping in view the severity of penalty, the financial manager must ensure that the amount of dividend is within the covenants aread committed to lenders.

Internal Constraints

Such factors are unique to a firm and include (i) liquid assets, (ii) growth prospects, (iii) financial requirements (iv) availability of funds (v) earnings stability and (vi) control.

Liquid Assets: Once the payment of dividend is permissible on legal and contractual grounds the next step is to ascertain whether the firm has sufficient cash funds to pay cash dividends. It may well be possible that the firm's earnings are substantial, but the firm may be short of funds. This situation is common for (a) growing companies; (h) companies which have to retire past loans their maturity year has come; and (c) companies whose preference shares are to be redeem. Such companies may not like to borrow at exorbitant rates because of the increased financial risk especially if their existing leverage ratio is already very high. Moreover, lenders may be reluctant to lend money for dividend payments since they produce no tangible or operating benefits that will help the firm to repay the loan. Thus, the firm's ability to pay cash dividends is largely restricted by the level of its liquid assets. On the other hand, if excess cash is available, the firm can have more liberal dividend policy.

Growth Prospects: Another set of factors that can influence dividend policy relates to the firm growth prospects. The firm is required to make plans for financing its expansion programmes in this context, the availability of external funds and its associated cost together with the need for investment funds would have a significant bearing on the firm's dividend policy.

Financial Requirements: Financial requirements of a firm are directly related to its investment needs. The firm should formulate its dividends policy on the basis of its foreseeable investment needs. If a firm has abundant investment opportunities, it should prefer a low payout ratio, as it can usually reinvest earnings at a higher rate than the shareholders can. Such firms, designated as 'growth' companies, are constantly in need of funds. Their financial requirements may be charcterised as large and immediate. That retention of earnings is less costly than selling a new issue of equity needs no reiteration. Moreover, retention of earnings provides the base upon which the firm can borrow additional funds. Therefore, it provides flexibility in the company's

capital structure, that is, it makes room for unused debt capacity. The importance of creation of debt raising potentials for a growing firm is overwhelming.

On the other hand, if the firm has little or no growth opportunities, it will probably prefer low retention and relatively high dividend payouts. This is so for two vital reasons. First, the shareholders can reinvest earnings at a higher rate than the firm can do, and, secondly, such firms may need funds largely to replace or modernise assets. In many instances, these outlays may not be required immediately but after two or three years. Therefore, the need for funds is small and periodic vis-a vis is large and fast growing companies. The nature of the firm's needs, therefore, is an important factor in determining the destination of the firm's fund—retention or distribution.

Availability of Funds: The dividend policy is also constrained by the availability of funds and the need for additional investment. In evaluating its financial position, the firm should consider not only its ability to raise funds but also the cost involved in it and the promptness with which financing can be obtained. In general, large, mature firms have greater access to new sources for raising funds than firms which are growing rapidly. For this reason alone, the availability of external funds to the growing firms may not be sufficient to finance a large number of acceptable investment projects. Obviously, such firms have to depend on their retained earnings so as to amount of maximum number of available profitable projects. Therefore, large retentions are necessary for such firms.

Earnings Stability: The stability of earnings also has a significant bearing on the dividend decision of a firm. Generally, the more stable the income stream, the higher is the dividend payout ratio. Such firms are more confident of maintaining a higher payout ratio. Public utility companies are classic examples of firms that have relatively stable earnings pattern and high dividend payout ratio. Growing firms, characterised by stable earnings, can muster debt funds at a relatively lower cost because of a smaller total risk (business and financial). This is unlike the experience of other firms which, though growing, suffer from fluctuating earnings.

However, the financial manager should remember that dividends have information value. Withholding the payment of dividends will raise the required rate of return of the investors and, therefore, depress the market price of the shares. The increase in earnings should be such that it can offset the unfavourable effect of the increased cost of equity (k_e).

Control: Dividend policy may also be strongly influenced by the shareholders or the management's control objectives. That is to say, sometimes management employs dividend policy as an effective instrument to maintain its position of command and control. The management, in order to retain control of the company in its own hands, may be reluctant to pay substantial dividends and would prefer a smaller dividend payout ratio. This will particularly hold good for companies which require funds to finance profitable investment opportunities when an outside group is seeking to gain control of the firm. Added to this, if a controlling group of shareholders either cannot or does not wish to purchase new shares of equity, under such circumstances, by the issue of additional shares to finance investment opportunities, management may lose its existing control. Conversely, if management is securely in control, either through substantial holdings or because the shares are widely held, and the firm has a good image, it can afford to have a high dividend payout ratio. If it requires funds later, the firm can easily raise additional funds owing to its reputation.

Owner's Considerations

The dividend policy is also likely to be affected by the owner's considerations of (a) the tax status of the shareholders, (b) their opportunities of investment, and (c) the dilution of ownership. It is well-nigh impossible to establish a policy that will maximise each owner's wealth. The firm must aim at a dividend policy which has a beneficial effect on the wealth of the majority of the shareholders.

Taxes: The dividend policy of a firm may be dictated by the income tax status of its shareholders. If a firm has a large percentage of owners who are in high tax brackets, its dividend policy should seek to have higher retentions. Such a policy will provide its owners with income in the form of capital gains as against dividends. Since capital gains are taxed at a lower rate than dividends, they are worth more, after taxes, to the individuals in a high tax bracket. On the other hand, if a firm has a majority of low income shareholders who are in a lower tax bracket, they would probably favour a higher payout of earnings because of the need for current income and the greater certainty associated with receiving the dividend now, instead of the less certain prospects of capital gains later.

Opportunities: The firm should not retain funds if the rate of return earned by it would be less than one which could have been earned by the investors themselves from external investments of funds. Such a policy would obviously be detrimental to the interests of shareholders. It is difficult to ascertain the alternative investment opportunities of each of its shareholders and, therefore, the alternative investment opportunity rate. However, the firm should evaluate the rate of return obtainable from external investments in firms belonging to the same risk class. If evaluation shows that the owners have better opportunities out side, the firm should opt for a higher D/P ratio. On the other hand, if the firm's investment opportunities yield a higher rate than that obtained from similar external investment, a low D/P is suggested. Therefore, in formulating dividend policy, the evaluation of the external investment opportunities of owners is very significant.

Dilution of Ownership: The financial manager should recognise that a high D/P ratio may result in the dilution of both control and earnings for the existing equity holders. Dilution in earnings results because low retentions may necessitate the issue of new equity shares in the future, causing an increase in the number of equity shares outstanding and ultimately lowering earnings per share and their price in the market. By retaining a high percentage of its earnings, the firm can minimise the possibility of dilution of earnings.

Thus, in framing the dividend policy of a firm, consideration must be given to the requirements of equity-holders.

Although the ultimate dividend policy depends on numerous factors, the avoidance of shareholders' discontent is important. If the shareholders become dissatisfied with the existing dividend policy, they may sell their shares, increasing the possibility that control of the firm will be seized by some outside group. The takeover of a firm by outsiders is more likely when owners are dissatisfied with its dividend policy. It is the financial manager's responsibility to keep in touch with the owners general attitude toward dividends.

Capital Market Considerations

Yet another set of factors that can strongly affect dividend policy is the extent to which the firm has access to the capital markets. In case the firm has easy access to the capital market, either because it is financially strong or large in size, it can follow a liberal dividend policy. However, if the firm has only limited access to capital markets, it is likely to adopt low dividend payout ratios. Such firms are likely to rely more heavily on retained earnings as a source of financing their investments.

Firms which lean heavily on financial institutions for procuring funds, declare a minimum dividend so that they can remain on the 'eligible' list of these institutions. It is because, in general, most financial institutions are prohibited by their charter from buying shares in companies which pay no dividends. A company should be paying dividends at a certain minimum rate for at least some specified number of year (5 years). Since such institutions are significant buyers of corporate securities, some firms that would otherwise have not paid any amount of dividend, would pay some dividend so that they remain on the eligible list.

Inflation

Inflation is another factor which affects the firm's dividend decision. With rising prices, funds generated from depreciation may he inadequate to replace obsolete equipments. These firms have to rely upon retained earnings as a source of funds to make up the shortfall. This aspect becomes all the more important if the assets are to be replaced in the near future. Consequently their dividend payout tends to be low during periods of inflation.

Dividend Policy in India

The main features of the corporate dividend policy in India are summarised below:

- Most of the corporates have a policy of long-run dividend pay-out ratio.
- Dividend changes follow shift in the long-term sustainable earnings.
- Dividend policy as a residual decision after meeting the desired investment needs is endorsed by about 50 per cent of the sample corporates. The corporares which are creating shareholders value (EVA) significantly rescind dividend increase in the event of growth opportunities available to them. Large firms are significantly less willing to rescind dividend increases.
- Dividend policy provides a signalling mechanism of the future prospects of the corporate and, to that exact, affects its market value.
- Investors have different relative risk perceptions of dividend income and capital gains and are not indifferent between receiving dividend income and capital gains. Management should be responsive to the shareholders preferences regarding dividend and the share buy back programme should not replace the dividend payments of the corporates.
- Dividend payments provide a bonding mechanism so as to encourage manager to act in the best interest of the shareholders.
- The corporate enterprises in India seem to have a tendency to pay relatively less dividends. In fact, a fairly large number of them hardly pay any dividend. The foreign controlled companies seem to follow a policy of larger distribution of profits relative to the domestic companies. Retained earnings are a significant source of corporate finance.

- The vast majority of the Indian corporates follows a stable dividend policy in the sense that they pay either constant dividend per share in the following year with fluctuating EPS or increased dividend with increase in EPS.
- An overwhelming majority of corporates have a long-run target D/P ratio. The dividend changes follow shift in long-run sustainable earnings.
- Firms which are creating shareholder value are significantly more willing to rescind dividend increase in the event of growth opportunities available to them. The larger firms are significantly less willing to rescind dividend increase than the small firms.
- Dividend policy provides a signalling mechanism of the future prospects of the firm and thus affects its market value. The investors are not indifferent between receiving dividend income and capital gains.

Suggested Reading

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Lesson 9

Working Capital Management : An Introduction

Working capital management is a significant in financial management due to the fact that it plays a pivotal role in keeping the wheels of a business enterprise running. Working capital management is concerned with short-term financial decisions. Shortage of funds for working capital has caused many businesses to fail and in many cases, has retarded their growth. Lack of efficient and effective utiilization of working capital leads to earn low rate of return on capital employed or even compels to sustain losses. The need for skilled working capital management has thus become greater in recent years. A firm invests a part of its permanent capital in fixed assets and keeps apart of it for working capital i.e., for meeting the day to day requirements. We will hardly find a firm which does not require any amount of working capital for its normal operations. The requirement of working capital varies from firm to firm depending upon the nature of business production policy, market conditions, seasonality of operations, conditions of supply etc. Working capital to a company is like the blood to human body. It is the most vital ingredient of a business. Working capital management if carried out effectively, efficiently and consistently, will ensure the health of an organization. A company invests its funds for long-term purposes and for short operations. That portion of a company's capital, invested in short-term or current assets to carry on its day to day operations smoothly, is called the 'working capital.

Working capital refers to firm's investment in short-term assets viz., cash, short-term securities, amounts receivables and inventories of raw materials, work-in-process and finished goods. It refers to all aspects of current assets and current liabilities. The management of working capital is no less important than the management of long-term financial investment. Sufficient liquidity is necessary and must be achieved and maintained to provide that fund's to payoff obligation as they arise or mature the adequacy of cash and other current assets together with their efficient handling virtually determine the survival of the company. The efficient working capital management is necessary to maintain a balance of liquidity and profitability. If the funds are tied-up in idle current assets represent poor and inefficient working capital management which affects the firm's liquidity as well as profitability.

Working capital is defined as 'the excess of current assets over current liabilities'. All elements of working capital are quick moving in nature and therefore, require constant monitoring for proper management. For proper management of working capital, it is required that a proper assessment of its requirement is made. Working capital is also known as circulating capital, Fluctuating capital and revolving capital. The magnitude and composition keep on changing continuously in the course of business. If the working capital level is not properly maintained and managed, then it may result in unnecessary blockage of scarce resources of the company. Therefore, the financial managers should give utmost care in management of working capital.

Objectives of Working Capital Management

The basic objectives of working capital management are as follows:
By optimizing the investment in current assets and by reducing the level of current liabilities, the company can reduce the locking-up of funds in working capital thereby; it can improve the return on capital employed in the business.

The second important objective of working capital management is that the company should always be in a position to meet its current obligations which should properly be supported by the current assets available with the firm. But, maintaining excess funds in working capital means locking of funds without return.

(c) The firm should manage its current assets in such a way that the marginal return on investment in these assets is not less than the cost of capital employed to finance the current assets.

(d) The firm should maintain proper balance between current assets and current liabilities to enable the firm to meet its day to day financial obligations.

Components of Working Capital

Current Assets: Current assets are those assets which are convertible into cash within a period of one year and are those which are required to meet the day to day operations of the business. The working capital management, to be more precise the management of current assets. The current assets are cash or near cash resources. These include:

(a) Cash and bank balances
(b) Temporary investments
(c) Short-term advances
(d) Prepaid expenses
(e) Receivables
(F) Inventory of raw materials, stores and spares
(g) Inventory of work-in-progress
(h) Inventory of finished goods

Current Liabilities

Current liabilities are those claims of outsiders which are expected to mature for payment within an accounting year. These include:

(I) Creditors for goods purchased
(2) Outstanding expenses
(3) Short-term borrowings
(4) Advances received against sales
(5) Taxes and dividends payable
(6) Other liabilities maturing within a year

Gross and Net Working Capital

Generally the working capital has its significance in two perspectives. These are gross working capital and net working capitals are combindlly called 'balance sheet approach' of working capital.

Gross Working Capital

The term 'gross working capital' refers to the Firm's investment in current assets. According to this concept working capital refers to a firm's investment in current assets. The amount of current liabilities is not deducted from the total of current assets. The concept of gross working capital is advocated for the following reasons:

(a) Profits of the firm are earned by making investment of its funds in fixed and current assets. This suggests the part of the earning relate to investment in current assets. Therefore, aggregate of current assets should be taken to mean the working capital.
(b) The management is more concerned with the total current assets as they constitute the total funds available for operating purposes than with the sources from which the funds come.
(c) An increase in the overall investment in the firm brings an increase in the working capital.

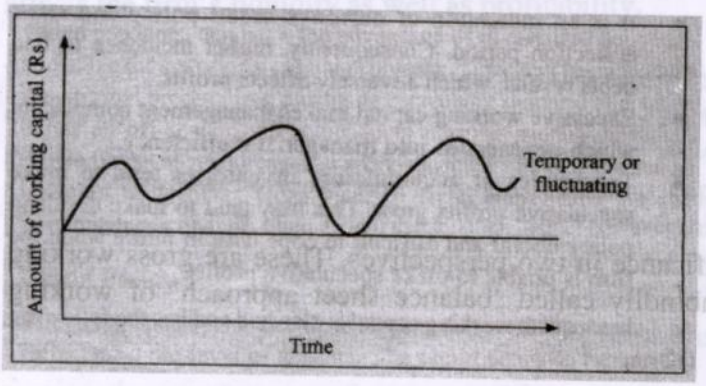
Net Working Capital

The term 'net working capital' refers to the excess of current assets over current liabilities and it is the difference between current assets and current liabilities. The net working capital is a qualitative concept which indicates the liquidity position of a firm and the extent to which working capital needs may be financed by permanent source of funds. The concept looks into the angle of judicious mix of long-term and short-term funds for financing current assets. A portion of net working capital should be financed with permanent sources of funds.

Permanent and Temporary Working Capital

The need for current assets arises because of the operating cycle. The operating cycle is a continuous process and, therefore, the need for current assets is felt constantly. But the magnitude of current assets needed is not always the same; it increases and decreases over time. However, there is always a minimum level of current assets which is continuously required by a firm to carry on its business operations. Permanent or fixed, working capital is the minimum level of current assets. It is permanent in the same way as the firm's fixed assets are. Depending upon the changes in production and sales, the need for working capital, over and above permanent working capital, will fluctuate. For example, extra inventory of finished goods will have to be maintained to support the peak periods of sale and investment in debtors (receivable) may also increase during such periods. On the other hand, investment in raw material, work-in-process and finished goods will fall if the market is slack.

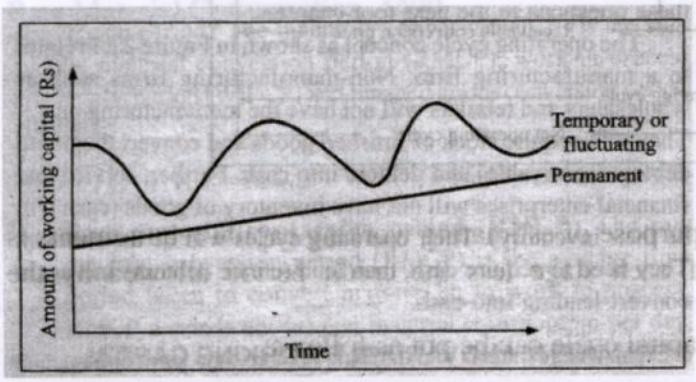
Figure 1 Permanent and Temporary Working Capital



Fluctuating or variable working capital is the extra working capital needed to support the changing production and sales activities of the firm. Both kinds of working capital— permanent and fluctuating (temporary)—are necessary to facilitate production and sale through the operating cycle. But the firm to meet liquidity requirements that will last only temporarily creates the temporary working capital. Figure 1 illustrates differences between permanent and

temporary working capital. It is shown that permanent working capital is stable over time, while temporary working capital is fluctuating—sometimes increasing and sometimes decreasing. However, the permanent working capital line need not be horizontal if the firm's requirement for permanent capital is increasing (or decreasing) over a period. For a growing firm, the difference between permanent and temporary working capital can be depicted through Figure2.

Figure 2 Permanent and Temporary Working Capital



Operating Cycle Concept

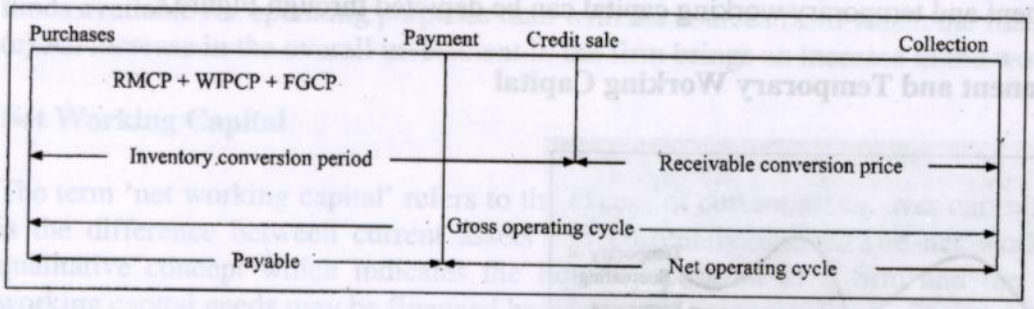
Working capital is the life blood of any business, without which the fixed assets are inoperative. Working capital circulates in the business, and the current assets change from one form to the other. Cash is used for procurement of raw materials and stores items and for payment of operating expenses, then converted into work-in-progress, then to finished goods. When the finished goods are sold on credit terms receivables balances will be formed. When the receivables are collected, it is again converted into cash. The need for working capital arises because of time gap between production of goods and their actual realization after sales. This time gap is called technically called as 'operating cycle' or 'working capital cycle.

The operating cycle of a company consists of time period between the procurement of inventory and the collection of cash from receivables. The operating cycle is the length of time between the company's outlay on raw materials, wages and other expenses and inflow of cash from sale of goods. Operating cycle is an important concept in management of cash and management at working capital. The operating cycle reveals the time that elapses between outlay of cash and inflow of cash. Quicker the operating cycle less amount of investment in working capital is needed and it improves the profitability. The duration of the operating cycle depends on the nature of industry and the efficiency in working capital management.

The knowledge of operating cycle is essential for smooth running of the business without shortage of working capital. The working capital requirement can be estimated with the help of duration of operating cycle. The longer the operating cycle, the larger the working capital requirements. If depreciation is excluded from expenses in the operating cycle, the net operating cycle represents 'cash conversion cycle,. The length of operating cycle is the indicator of efficiency in management of short term funds and working capital. The operating cycle calls for proper monitoring of external environment of the business- Changes in government policies like taxation, import restrictions, credit policy of central bank etc will have impact on the length of operating cycle. It is the task of Finance Manager to manage the operating cycle effectively and efficiently. Based on the length of operating cycle, the working capital finance is done by the

commercial banks. The reduction in operating cycle will improve the cash conversion cycle and ultimately improve the profitability of the firm.

Figure- 3 Operating Cycle



The duration of the operating cycle for the purpose of estimating working capital requirements is equivalent to the sum of the durations of each stage less the credit period allowed by the suppliers of the firm.

Symbolically, the duration of the working capital cycle can be put as follows:

O=R+W+F+D+C

Where

O = Duration of operating cycle;
R = Raw materials and stores storage period;
W= Work in process period;
F = Finished stock storage period;
D = Debtors' collection period;
C = Creditors' payment period.

Each of the components of the operating cycle can be calculated as follows:

$$R = \frac{\text{Average stock of raw materials and stores}}{\text{Average Raw Materials and stores consumption per day}}$$

$$W = \frac{\text{Average work in process inventory}}{\text{Average cost of production per day}}$$

$$F = \frac{\text{Average finished stock inventory}}{\text{Average cost of goods sold per day}}$$

$$D = \frac{\text{Average book debts}}{\text{Average credit purchases per day}}$$

$$C = \frac{\text{Average credit sales per day Average trade creditors}}{\text{Average credit purchases per day}}$$

After computing the period of one operating cycle, the total number of operating cycles that can be completed during a year can be computed by dividing 365 days with the number of operating days in a cycle. The total operating expenditure in the year when divided by the number of operating cycles in a year will give the average amount of the working capital requirement.

Example 1

From the following information, extracted from the books of a manufacturing company, compute the operating cycle in days and the amount of working capital required:

Period covered	365
Average period of credit allowed by suppliers	16 days
Average Total of Debtors Outstanding	480
Raw Material Consumption	4400
Total Production Cost	10000
Total Cost of Sales	10500
Sales for the year	16000
Value of Average Stock maintained:	
Raw Material	320
Work-in-progress	350
Finished Goods	260

Solution

COMPUTATION OF OPERATING CYCLE

(i) *Raw materials held in stock*

$$\frac{\text{Average stocks of raw materials held}}{\text{Average consumption per day}} = \frac{320}{4,400/365} = \frac{320 \times 365}{4400} = 27 \text{ days}$$

Less: Average credit period granted by suppliers — 16 days

11 days

(ii) *Work-in-progress:*

$$\frac{\text{Average WIP maintained}}{\text{Average cost of production per day}} = \frac{350}{10,000/365} = \frac{365 \times 350}{10,000} = 13 \text{ days}$$

(iii) *Finished Goods held in stock:*

$$\frac{\text{Average finished goods maintained}}{\text{Average cost of goods sold per day}} = \frac{260}{10,500/365} = \frac{260 \times 365}{10,500} = 9 \text{ days}$$

(iv) *Credit period allowed to debtors:*

$$\frac{\text{Average total of outstanding debtors}}{\text{Average credit sales per day}} = \frac{480}{16,000/365} = \frac{365 \times 480}{16,000} = 11 \text{ days}$$

Total operating cycle period: *(i) + (ii) + (iii) + (iv)* = 44 days

Number of Operating cycles in a year = 365/44 = 8.30

$$\text{Amount of Working Capital required} = \frac{\text{Total Operating Cost}}{\text{Number of Operating Cycles in a year}}$$

= 10,500/8.3

= Rs. 1,265

Alternatively, the amount of working capital could have also been calculated by estimating components of working capital method, as shown below:

	(Rs. *in* '000)
Value of Average Stock Maintained:	
Raw Material	320
Work-in-progress	350
Finished Goods	260
Average Debtors Outstanding	480
	1,410
Less: Average Creditors outstanding: $\left(\frac{4,400}{365} \times 16\right)$	193
Working capital required	1,217

Determinants of Working Capital

A firm should plan its operations in such a way that it should have neither too much nor too little working capital. The total working capital requirement is determined by a wide variety of factors. These factors, however, affect different enterprises differently. They also vary from time to time. In general the following factors are involved in a proper assessment of the quantum of working capital required.

General Nature of Business

The working capital requirements of an enterprise are basically related to the conduct of business. Enterprises fall into some broad categories depending on the nature of their business. For instance, public utilities have certain features which have a bearing on their working capital needs. The two relevant features are: (i) the cash nature of business, that is, cash sale, and (ii) sale of services rather than commodities. In view of these features, they do not maintain big inventories and have, therefore, probably the least requirement of working capital. At the other extreme are trading and financial enterprises. The nature of their business is such that they have to maintain a sufficient amount of cash, inventories and book debts. They have necessarily to invest proportionately large amounts in working capital. The manufacturing enterprises fall, in a sense, between these two extremes. The industrial concerns require fairly large amounts of working capital though it varies from industry to industry depending on their asset structure.

Production Cycle

Another factor which has a bearing on the quantum of working capital is the production cycle. The term 'production or manufacturing cycle refers to the time involved in the manufacture of goods. It covers the time-span between the procurement of raw materials and the completion of the manufacturing process leading to the production of finished goods. Funds have to be necessarily tied up during the process of manufacture, necessitating enhanced working capital. In other words, there is some time gap before raw materials become finished goods. To sustain such activities the need for working capital is obvious. The longer the time-span (i.e. the production cycle), the larger will be the tied-up funds and, therefore, the larger is the working capital needed and vice-versa. There are enterprises which, due to the nature of business, have a short operating cycle.

Business Cycle

The working capital requirements are also determined by the nature of the business cycle. Business fluctuations lead to cyclical and seasonal changes which, in turn, cause a shift in the working capital position, particularly for temporary working capital requirements. The variations in business conditions may be in two directions: (i) upward phase, when boom conditions prevail, and (ii) downswing phase when the economic activity is marked by a decline. During the upswing of business activity, the need for working capital is likely to grow to cover the lag between increased sales and receipt of cash as well as to finance purchases of additional material to cater to the expansion of the level of activity. Additional funds may be required to invest in plant and machinery to meet the increased demand. The downswing phase of the business cycle has exactly an opposite effect on the level of working capital requirement. The decline in the

economy is associated with a fall in the volume of sales which, in turn, leads to fail in the level of inventories and book debts. The need for working capital in recessionary conditions is bound to decline. In brief, business fluctuations influence the size of working capital mainly through the effect on inventories. The response of inventory to business cycles is mild or violent according to nature of the business cycle.

Seasonal Policy

The quantum of working capital is also determined by production policy. In case of certain lines of business, the demand for products is seasonal, that is, they are purchased during certain months of the year. What kind of production policy should be followed in such cases? There are two options open to such enterprises: either they confine their production only to periods when goods are purchased or they follow a steady production policy throughout the year and produce goods at a level to meet the peak demand. In the former case, there are serious production problems. During the slack season, the firms have to maintain their working force and physical facilities without adequate production and sale. When the peak period arrives, the firms have to operate at full capacity to meet the demand. This kind of arrangement would not only be expensive but also inconvenient. Thus, serious difficulties will be encountered in trying to match production to the go out and flow of the seasonal demand pattern. A better alternative is a steady production policy independent of shifts in demand for the finished goods. This means a large accumulation or finished goods (inventories) during the off-season and their abrupt sale during the peak season.

Credit Policy

Tm credit policy relating to sales and purchases also affects the working capital. The credit policy influences the requirement of working capital in two ways: (i) through credit terms granted by to its customers/ buyers of goods; (ii) credit terms available to the firm from its creditors.

The credit terms granted to customers have a bearing on the magnitude of working capital by determining the level of book debts. The credit sales result in higher book debts (receivables) higher book debts mean more working capital. On the other hand, if liberal credit term is available from the suppliers of goods (trade creditors), the need for working capital is less. The working capital requirements of a business are, thus, affected by the terms of purchase and sale and role given to credit by a company in its dealings with creditors and debtors. Credit terms fixed by an enterprise are affected by the prevailing trade practices as well as changing economic conditions.

Growth and Expansion

As a company grows, it is logical to expect that a larger amount of working capital is required. It is, of course, difficult to determine precisely the relationship between the growth in the volume of business of a company and the increase in its working capital. The composition of working capital in a growing company also shifts with economic circumstances and corporate practices. Other things being equal, growth industries require more working capital than those that are static. 'The critical fact, however, is that the need for increased working capital funds does not follow the growth in business activities but precedes it'. Advance planning of working capital is, therefore, a continuing necessity for a growing concern. Or else, the company may have substantial earnings but little cash.

Availability of Raw Material

The availability or otherwise of certain raw materials on a continuous basis without interruption would sometimes affect the requirement of working capital. There may be some materials which cannot be procured easily either because of their sources are few or they are irregular. To sustain smooth production therefore, the firm might be compelled to purchase and stock them far in excess of genuine production needs. This will result in an excessive inventory of such materials. The procurement of some essential raw materials is difficult because of their sporadic supply. This happens very often with raw materials which are in short supply and are controlled to ensure equitable distribution. The buyer has in such cases very limited options as to the quantum and timing of procurement. It may so happen that a bulk consignment may be available but the firm may be short of funds, while when surplus funds are available the commodities may be in short supply. This element of uncertainty would lead to a relatively high level of working capital.

Level of Taxes

The first appropriation out of profits is payment or provision for tax. The amount of taxes to be paid is determined by the prevailing tax regulations. The management has no discretion in this respect. Very often, taxes have to he paid in advance on the basis of the profit of preceding year. Tax liability is, in a sense, short-term liability payable in cash. An adequate provision for tax payments is, therefore, an important aspect of working capital planning. If tax liability increases, it leads to an increase in the requirement of working capital and vice-versa.

Management has no discretion in regard to the payment of taxes; in some cases non-payment may invite penal action. There is, however, wide scope to reduce the tax liability through proper tax planning. The service of tax experts can be availed of to take advantage of the various concessions, incentives through avoidance as opposed to evasion of taxes. Tax planning can, therefore, be said to be an integral part of working capital planning.

Dividend Policy

Another appropriation of profits which has a bearing on working capital is dividend payment. The payment of dividend consumes cash resources and, thereby, affects working capital to that extent. Conversely, if the firm does not pay dividend but retains the profits, working capital increases. In planning working capital requirements, therefore, a basic question to be decided is whether profits will be retained or paid out to shareholders.

Depreciation Policy

Depreciation policy also exerts an influence on the quantum of working capital. Depreciation charges do not involve any cash outflows. The effect of depreciation policy on working capital is, therefore, indirect. In the first place, depreciation affects the tax liability and retention of profits. Depreciation is allowable expenditure in calculating net profits. Enhanced rates of depreciation lower the profits and, therefore, the tax liability and, thus, more cash profits. Higher depreciation also means lower disposable profits and, therefore, a smaller dividend payment. Thus, cash is preserved. In the second place, the selection of the method of depreciation has important financial implications.

Price Level Changes

Changes in the price level also affect the requirements of working capital. Rising prices necessitate the use of more funds for maintaining an existing level of activity. For the same level of current assets, higher cash outlays are required. The effect of rising prices is that a higher amount of working capital is needed. However, in the case of companies which can raise their prices proportionately, there is no serious problem regarding working capital. Moreover, the price rise does not have a uniform effect on all commodities. It is likely that some firms may not be affected at all. In brief, the implications of changing price levels on working capital position vary from company to company depending on the nature of its operations, its standing in the market and other relevant considerations.

Operating Efficiency

The operating efficiency of the management is also an important determinant of the level of working capital. The management can contribute to a sound working capital position through operating efficiency. Although the management cannot control the rise in prices, it can ensure the efficient utilisation of resources by eliminating waste, improving coordination, and a fuller utilisation of existing resources, and so on. Efficiency of operations accelerates the pace of cash cycle and improves the working capital turnover. It releases the pressure on working capital by improving profitability and improving the internal generation of funds.

To conclude, the level of working capital is determined by a wide variety of factors which are partly internal to the firm and partly external (environmental) to it. Efficient working capital management requires efficient planning and a constant review of the needs for an appropriate working capital strategy.

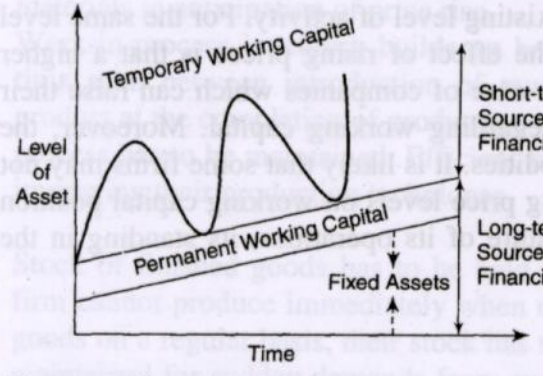
Working Capital Financing Policies

The financing of working capital is very crucial to management of working capital as it makes a significant impact on the firm profitability and liquidity position. Theoretically, there can be three possible approaches to working capital financing: matching, conservative, and aggressive. The mix of short-term and long-term sources of working capital financing varies in each approach, and consequently, the impact of each of the three approaches on the profitability and liquidity position of the business also varies.

Matching Approach

This is the conventional approach to financing. As per this approach, the duration of requirement of funds should be matched with the duration of the sources of financing, as can be seen in Figure 4. That is, while the fixed assets and the permanent (core) current assets must be financed by long-term sources of finance, the temporary current assets alone should be financed by short-term sources of funds. This approach follows the middle path of working capital financing.

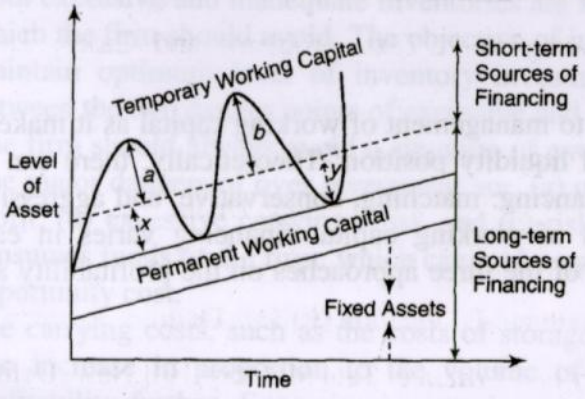
Figure-4 Conventional approach to working capital financing



Conservative Approach

This approach favours maximum reliance on long-term sources of financing. A firm following this approach would finance not only its fixed assets and its permanent working capital from long-term sources, but would also partly finance it temporary (seasonal) working capital requirements from long-term sources as can be seen in Figure 5. The conservative approach is termed as a low profitability and high liquidity approach to working capital financing because more reliance on long-term funds impacts returns adversely, although it strengthens the liquidity position of the business. In Figure 5, a and b denote the part of seasonal working capital needs that is financed from short-term sources of financing, and x and y denote disinvestment of, and investments in, respectively, of marketable securities.

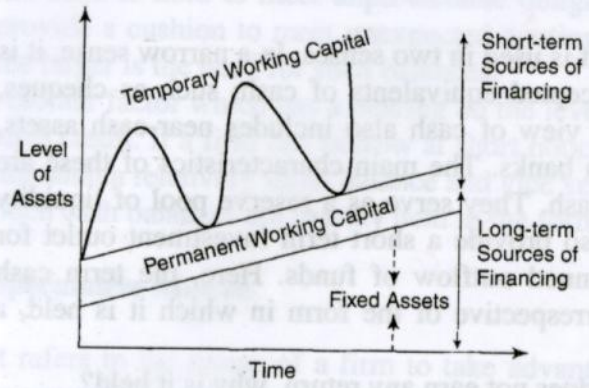
Figure-5 Conservative Approach to working capital financing



Aggressive Approach

Aggressive approach to working capital financing favours maximum reliance on short-term sources. The working capital financing policy of a firm is said to be aggressive if it finances a part of its permanent working capital requirements from short-term sources. This is a high-profitability and low liquidity approach to working capital financing (see Figure 6).

Figure-6 Aggressive approach to working capital financing



Although the terminology matching, conservative, and aggressive may not be standard and universally applicable, the idea behind classifying the working capital financing policy of firms under these three broad categories is to make working capital financing policies across firms and over time comparable for the purposes of analysis and decision making. A firm may be more aggressive in its working capital financing vis-a vis other firms in the sector, or compared with its own financing policy in the past.

Suggested Reading

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Lesson 10

Cash Management

The term 'cash' with reference to cash management is used in two senses. In a narrow sense, it is used broadly to cover currency and generally accepted equivalents of cash; such as cheques, drafts, and demand deposits in banks. The broad view of cash also includes near-cash assets, such as marketable securities and time deposits in banks. The main characteristics of these are that they can be readily sold and converted into cash. They serve as a reserve pool of liquidity that provides cash quickly when needed. They also provide a short term investment outlet for excess cash and are also useful for meeting planned outflow of funds. Here, the term cash management is employed in the broader sense. Irrespective of the form in which it is held, a distinguishing feature of cash
as an asset, is that it has no earning power. If cash does not earn any return, why is it held?

There are four primary motives for maintaining cash balances: (i) Transaction motive: (ii) Precautionary motive; (iii) Speculative motive and (iv) Compensating motive.

Transaction Motive

An important reason for maintaining cash balances is the transaction motive. This refers to the holing of cash to meet routine cash requirements to finance the transactions which a firm carries in the ordinary course of business. A firm enters into a variety of transactions to accomplish its objectives which have to be paid for in the form of cash. For example, cash payments have to be made for purchases, wages, operating expenses, financial charges like interest, taxes, and dividends and so on. Similarly, there is a regular inflow of cash to the firm from sales operations, returns on outside investments, and so on. These receipts and payments constitute a continuous two-way flow of cash. But the inflows (receipts) and outflows (disbursements) do not perfectly coincide or synchronize. At times, receipts exceed outflows while, at other times payments exceed inflows. To ensure that the firm can meet its obligations when payments become due in a situation in which disbursements are in excess of the current receipts, it must have adequate cash balance. The requirement of cash balances to meet routine cash needs is known as the transaction motive and such motive refers to the holding of cash to meet anticipated obligations whose timing is not perfectly synchronised with cash receipts. If the receipts of cash and its disbursements could exactly coincide in the normal course of operations, a firm would not need cash for transaction purposes. Although a major part of transaction balances are held in cash, a part may also be in such marketable securities whose maturity confirm to the timing of the anticipated payments such as payment of taxes, dividends, and so on.

Precautionary Motive

In addition to the non-synchronization of anticipated cash inflows and outflows in the ordinary course of business, a firm may have to pay cash for purposes which cannot be predicted or anticipated. The unexpected cash needs at short notice may be the result of:

- Floods, strikes and failure of important customers;
- Bills may be presented for settlement earlier than expected;
- Unexpected slow down in collection of accounts receivable;
- Cancellation of some order for goods as the customer is not satisfied; and
- Sharp increase in cost of raw materials.

The cash balances held in reserve for such random and unforeseen fluctuations in cash flows are called as precautionary balances. In other words, precautionary motive of holding cash implies the need to hold to meet unpredictable obligations. Thus, precautionary cash balance serves to provide a cushion to meet unexpected contingencies. The more unpredictable are the cash flow the larger is the need for such balances.

Another factor which has a bearing on the level of such cash balances is the availability of short-term credit. If a firm can borrow at short notice to pay for unforeseen obligations, it will need-to maintain a relatively small balance and vice versa.

Such cash balances are usually held in the form of marketable securities so that they earn a return.

Speculative Motive

It refers to the desire of a firm to take advantage of opportunities which present themselves at unexpected moments and which are typically outside the normal course of business. While the precautionary motive is defensive in nature in that firms must make provisions to tide over unexpected contingencies, the speculative motive represents a positive and aggressive approach. Firms aim to exploit profitable opportunities and keep cash in reserve to do so. The speculative motive helps to take advantage of:

- An opportunity to purchase raw materials at a reduced price on payment of immediate cash;
- A chance to speculate on interest rate movements by buying securities when interest rates are expected to decline;
- Delay purchases of raw materials on the anticipation of decline in prices; and
- Make purchase at favourable prices.

Compensating Motive

Yet another motive to hold cash balances is to compensate banks for providing certain services and loans. Banks provide a variety of services to business firms, such as clearance of cheque, supply of credit information, transfer of funds, and so on. While for some of these services banks charge a commission or fee for others they seek indirect compensation. Usually clients are required to maintain a minimum balance of cash at the bank. Since this balance cannot be utilized by the firms for transaction purposes, the banks themselves can use the amount to earn a return. Such balances are compensating balances.

Compensating balances are also required by some loan agreements between a bank and its customers. During periods when the supply of credit is restricted and interest rates are rising, banks require a borrower to maintain a minimum balance in his account as a condition precedent to the grant of loan. This is presumably to compensate the bank for a rise in the interest rate during the period when the loan will be pending. The compensating cash balances can take either of two forms:

i) an absolute minimum, say Rs 5 lakh, below which the actual bank balance will never fall.

ii) a minimum average balance say, Rs 5 lakh over the month. The first alternative is more restrictive as the average amount of cash held during the month must be above Rs 5 lakh by the amount of the transaction balance. From the firm's viewpoint, this is obviously dead money. Under the second alternative, the balance could fall to zero one day provided it was Rs 10 lakh some other day with the average working to Rs 5 lakh.

Of the four primary motive of holding cash balances, the two most important are the transactions motive and the compensation motive. Business firms normally do not speculate and need not have speculative balances. The requirement of precautionary balances can be met out of short-term borrowings.

Objectives of Cash Management

There are two basic objectives of cash management:

1. To meet the cash disbursement needs as per the payment schedule;
2. To minimise the amount locked up as cash balances.

As a matter of fact both the objectives are mutually contradictory and, therefore, it is a challenging task for the finance manager to reconcile them and to have the best in this process.

1. Meeting cash disbursements

The first basic objective of cash management is to meet the payments schedule. In other words, the firm should have sufficient cash to meet the various requirements of the firm at different periods of times. The business has to make payment for purchase of raw materials, wages, taxes, purchase of plant, etc. The business activity may come to a grinding halt if the payment schedule is not maintained. Cash has, therefore, been aptly described as the "oil to lubricate the ever-turning wheels of the business, without it the process grinds to a stop."

2. Minimising funds locked up as cash balances

The second basic objective of cash management is to minimise the amount locked up as cash balances. In the process of minimising the cash balances, the Finance Manager is confronted with two conflicting aspects. A higher cash balance ensures proper payment with all its advantages. But this will result in a large balance of cash remaining idle. Low level of cash balance may result in failure of the firm to meet the payment schedule. The finance manager should, therefore, try to have an optimum amount of cash of balance keeping the above facts in view.

Cash Management Techniques

One of the basic objectives of cash management is to minimise the level of cash balance with the firm. This objective is sought to be achieved by means preparing Cash Budget. Cash budget or cash forecast is the most significant device for planning and controlling the use of cash. It involves a projection of future cash receipts and cash disbursements of the firm over various intervals of time. It reveals to the finance manager the timings and amount of expected cash inflows and outflows over a period studied. With this information, he is better able to determine the future cash needs of the firm, plan for the financing of these needs and exercise control over the cash and liquidity of the firm.

Thus, in case a cash budget is properly prepared it correctly reveals the timings and size of net cash flows as well as the periods during which the excess cash may be available for temporary investment. In a small company, the preparation of a cash budget or a cash forecast does not involve much of complications and, therefore, relatively a minor job. However, in case of big companies, it is almost a full time job handled by a senior person, namely, the budget controller or the treasurer.

The strategic aspects of efficient cash management are: (i) efficient inventory management, (ii) speedy collection of accounts receivable, and (iii) delaying payments on accounts payable. There are some specific techniques and processes for speedy collection of receivables from customers and slowing disbursements.

Speedy Cash Collections

In managing cash efficiently, the cash inflow process can be accelerated through systematic planning and refined techniques. There are two broad approaches to do this. In the first place, the customers should be encouraged to pay as quickly as possible. Secondly, the payment from customers should be converted into cash without any delay.

Prompt Payment by Customers

One way to ensure prompt payment by customers is prompt billing. What the customer has to pay and the period of payment should be notified accurately and in advance. The use of mechanical devices for billing along with the enclosure of a self-addressed return envelope will speed up payment by customers. Another, and more important, technique to encourage prompt payment by customers is the practice of offering cash discounts. The availability of discount implies considerable saving to the customers. To avail of the facility, the customers would be eager to make payment early.

Early Conversion of Payments into Cash

Once the customer makes the payment by writing a cheque in favour of the firm, the collection can be expedited by prompt encashment of the cheque. There is a lag between the time a cheque is prepared and mailed by the customer and the time the funds are included in the cash reservoir of the firm. Within this time interval three steps are involved: (a) transit or mailing time, that is, the time taken by the post offices to transfer the cheque from the customers to the firm. This delay or lag is referred to as postal float; (b) time taken in processing the cheques within the firm before they are deposited in the bank termed as lethargy; and (c) collection time within the bank, that is, the time taken by the bank in collecting the payment from the customer's bank. This is called bank float. The early conversion of payment into cash, as a technique to speed up collection of accounts receivable, is done to reduce the time lag between posting of the cheque by the customer and the realisation of money by the firm. The postal float, lethargy and bank float are collectively referred to as deposit float. The term deposit float is defined as the sum of cheques written by customers that are not yet usable by the firm.

The collection of accounts receivable can be considerably accelerated, by reducing transit, processing and collection time. An important cash management technique is reduction in deposit float. This is possible if a firm adopts a policy of decentralised collections. Some of the important processes that ensure decentralised collection so as to reduce (i) the amount of time that elapses between the mailing of a payment by a customer, and (ii) the point the funds become available to the firm for use. The principal methods of establishing a decentralised collection network are (a) Concentration Banking, and (b) Lock-box System.

Concentration Banking

In this system of decentralised collection of accounts receivable, large firms which have a large number of branches at different places, select some of the strategically located branches as collection centres for receiving payment from customers. Instead of all the payments being collected at the head office of the firm, the cheques for a certain geographical area are collected at a specified local collection centre. Under this arrangement, the customers are required to send their payments (cheques) to the collection centre covering the area in which they live and these are deposited in the local account of the concerned collection centre, after meeting local expenses, if any. Funds beyond a predetermined minimum are transferred daily to a central or disbursing or concentration bank or account. A concentration bank is one with which the firm has a major account—usually a disbursement account. Hence, this arrangement is referred to as concentration banking.

Concentration banking, as a system of decentralised billing and multiple collection points, is a useful technique to expedite the collection of accounts receivable. It reduces the time needed in the collection process by reducing the mailing time. Since the collection centres are near the customers, the time involved in sending the bill to the customer is reduced. Moreover, the time-lag between the despatch of the cheque by the customer and its receipt by the firm is also reduced. Mailing time is saved both in respect of sending the bill to the customers as well as in the receipt of payment. The second reason why deposit float is reduced by concentration banking is that the banks of the firm as well as the customers may be in close proximity. Thus, the arrangement of multiple collection centres with concentration banking results in a saving of time in both mailing and clearance of customer payments and leads to a reduction in the operating cash requirements. Another advantage is that concentration permits the firm to 'store' its cash more efficiently. This is so mainly because by pooling funds for disbursement in a single account, the aggregate requirement for cash balance is lower than it would be if balances are maintained at each branch office.

Lock-Box System

The concentration banking arrangement is instrumental in reducing the time involved in mailing and collection. But with this system of collection of accounts receivable processing for purpose of internal accounting is involved, that is, some time elapses before a cheque is deposited by the local collection centre in its account. The lock-box system takes care of this kind of problem, apart from effecting economy in mailing and clearance times. Under this arrangement, firms hire a post office lock-box at important collection centres. The customers are required to remit payments to the post office lock-box. The local banks of the firm, at the respective places, are authorised to open the box and pick up the remittances (cheques) received from the customers. Usually, the authorised banks pick up the cheques several times a day and deposit them in the firm's accounts. After crediting the account of the firm, the banks send a deposit slip alongwith the list of payments and other enclosures, if any, to the firm by way of proof and record of the collection.

Thus, the lock-box system is like concentration banking in that the collection is decentralized and is done at the branch level. But they differ in one very important respect. While the customer sends the cheques, under the concentration banking arrangement to the collection centres, he sends them to a post office box under the lock-box system. The cheques are directly received by bank which empties the box and not from the firm or its local branch. In a way, the lock-box arrangement is an improvement over the concentration banking system.

Slowing Disbursements

Apart from speedy collection of accounts receivable, the operating cash requirement can be reduced by slow disbursements of accounts payable. In fact, slow disbursements represent a source of funds requiring no interest payments. There are several techniques to delay payment of accounts payable namely, (i) avoidance of early payments: (ii) centralised disbursements: (iii) floats: and (iv)accruals.

Avoidance of Early Payments

One way to delay payments is to avoid early payments. According to the terms of credit, a firm is required to make a payment within a stipulated period. It entitles a firm to cash discounts. If, however, payments are delayed beyond the due date, the credit standing may be adversely affected so that the firms would find it difficult to secure trade credit later. But if the firm pays its accounts payable before the due date it has no special advantage. Thus, a firm would be well advised not to make payments early, that is, before the due date.

Centralised Disbursements

Another method to slow down disbursements is to have centralised disbursements. All the payments should be made by the head office from a centralised disbursement account. Such an arrangement would enable a firm to delay payments and conserve cash for several reasons. Firstly, it involves increase in the transit time. The remittance from the head office to the customers in distant places would involve more mailing time than a decentralised payment by the local branch. The second reason for reduction in operating cash requirement is that since the firm has a centralised bank account, a relatively smaller total cash balance will be needed. In the case of a decentralised arrangement, a minimum cash balance will have to be maintained at each branch which will add to a large operating cash balance. Finally, schedules can be tightly controlled and disbursements made exactly on the right day.

Float

A very important technique of slow disbursements is float. The term float refers to the amount of money tied up in cheques that have been written, but have yet to he collected and encashed. Alternatively, float represents the difference between the bank balance and book balance of cash of a firm. The difference between the balance as shown by the firm's record and the actual bank balance is due to transit and processing delays. There is a time-lag between the issue of a cheque by the firm and its presentation to its bank by the customer bank for payment. The implication is that although the cheque has been issued, cash would be required later when the cheque is presented for encashment. Therefore, a firm can send remittances although it does not have cash in its bank at the time of issuance of the cheque. Meanwhile, funds can be arranged to make payment when the cheque is presented for collection after a few days. Float used in this sense is called as cheque kiting. There are two ways of doing it: (a) paying from a distant bank, (b) scientific cheque-cashing analysis.

Paying From a Distant Bank

The firm may issue a cheque on banks away from the creditor's bank. This would involve relatively longer transit time for the creditor's bank to get payment and, thus, enable the firm to use its funds longer.

Cheque-encashment Analysis

Another way to make use of float is to analyse, on the basis of past experience, the time-lag in the issue of cheques and their encashment. For instance, cheques issued to pay wages and salary may not be encashed immediately: it may be spread over a few days, say, 25 per cent on one day, 50 per cent on the second day and the balance on the third day. It would mean that the firm should keep in the hank nor the entire amount of a payroll but only a fraction represented by the actual withdrawal each day. This strategy would enable the firm to save operating cash.

Accruals:

Finally, a potential tool for stretching accounts payable is accruals which are defined as current liabilities that represent a service or goods received by a firm but not yet paid for. For instance, payroll, that is, remuneration to employees who render service in advance and receive payment later. In a way, they extend credit to the firm for a period at the end of which they are say, a week or a month. The longer the period after which payment is made, the greater is amount of free financing consequently and the smaller is the amount of cash balances required. Thus, less frequent payrolls, that is, weekly as compared to monthly, are an important source of accrual. They can be manipulated to slow down disbursements. Other examples of accrual are rent to

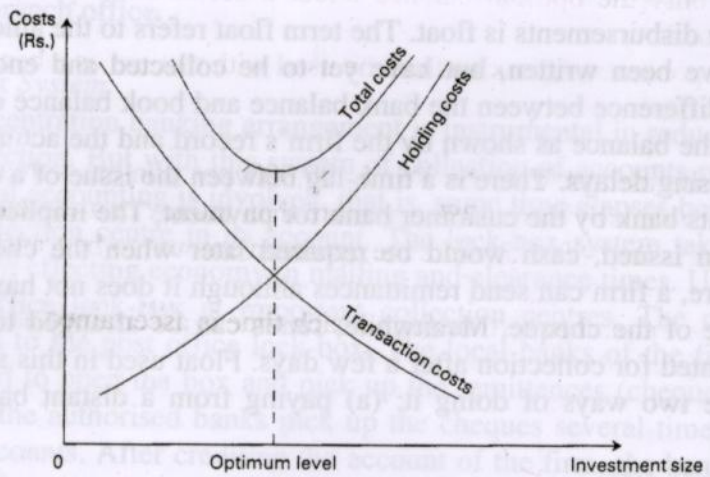
lessers and taxes to government. But these can be utilised only to a limited extent as there are legal constraints beyond which such payments cannot be extended.

Models of Cash Management

J. Baumol's Model of Cash Management (1952)

Willam. J. Baumol suggested that cash may be managed in the same way as any other inventory and that the inventory model could reasonably reflect the cost - volume relationships as well as the cash flows. In this way, the economic order quantity (EOQ) model of inventory management could be applied to cash management. It provides a useful conceptual foundation for the cash management problem.

Baumol EOQ Model



In the model, the carrying cost of holding cash-namely the interest forgone on marketable securities is balanced against the fixed cost of transferring marketable securities to cash, or vice versa. The Baumol model finds a correct balance by combining holding cost and transaction cost so as to minimize the total cost of holding cash. The optimum level of cash balance is found to be

$$C = \sqrt{\frac{2AT}{I}}$$

Where,

C= Optimum level of cash balance

A = Annual cash payments estimated

T=Cost per transaction of purchase or sale of marketable securities

I = Interest on marketable securities p.a. (ie., carrying cost per rupee of cash)

According to the model, optimum cash level is that level of cash where the carrying costs and transaction costs are the minimum. The carrying costs refers to the cost of holding cash i.e. interest forgone on marketable securities. The transaction cost refers to the cost involved in getting the marketable securities converted into cash and vice versa.

The Baumol's model holds good if the following assumptions are fulfilled:

(a) The rate of cash usage is constant and known with certainty. The model has limited use in times of uncertainty and firms whose cash flows are discontinuous or bumpy.

(b) The surplus cash is invested into marketable securities and those securities are again disposed off to convert them again into cash. Such purchase and sale transactions invo1ve certain costs like clerical, brokerage, registration and other costs. The cost to be incurred for each such

transaction is assumed to be constant/fixed. In practice, it would be difficult to calculate the exact transaction cost.

(c) By holding cash balance, the firm is would incur the opportunity cost of interest forgone by not investing in marketable securities. Such holding cost per annum is assumed to be constant.

(d) The short-term marketable securities can be freely bought and sold. Existence of free market for marketable securities is a prerequisite of the Baumol model.

Limitations

The important limitations in Baumol model are as follows:

1) The model can be applied only when the payments position can be reasonably assessed.

ii) Degree of uncertainty is high in predicting the cash flow transactions.

iii) The model merely suggests only the optimal balance under a set of assumptions. But, in actual situation it may not hold good.

Nevertheless it does offer a conceptual framework and can be used with caution as a benchmark.

Example 1

The outgoings of Gemini Ltd. are estimated to be Rs. 5, 00,000 per annum, spread evenly throughout the year. The money on deposit earns 12% p.a. more than money in a current account. The switching cost per transaction is Rs. 150. Calculate the optimum amount to be transferred.

Solution

According to Baumol the optimum amount to be transferred each time is ascertained as follows:

$$C = \sqrt{\frac{2AT}{I}}$$

where

C = Optimum transaction size

A = Estimate cash outgoings per annum i.e. Rs. 5,00,000

T = Cost per transaction i.e. Rs. 150

I = Interest rate on fixed deposit i.e. 12% p.a.

$$C = \sqrt{\frac{2 \times 150 \times 5,00,000}{0.12}}$$

C = Rs. 35,355 say Rs. 35,000

Number of transactions p.a. = Rs. 5,00,000/Rs. 35,000 = 14 transactions

Average balance in the short notice account = Rs. 35,000/2 = Rs. 17,500

Aggregate of fixed cost = 14 transactions X Rs. 150 = Rs. 2,100

Example 2

ABC Ltd. has estimated that use of Rs. 24 lakhs of cash during the next budgeted year. It intends to hold cash in a commercial bank which pay interest 10% p.a. For each withdrawal, the company incurs expenditure of Rs. 150. What is the optimal size for each withdrawal?

Solution

$$C = \sqrt{\frac{2 \times 150 \times 24,00,000}{0.10}}$$

= Rs 84853 or 85000

Each time the firm will withdraw Rs. 85,000 from the bank deposit. After spending all the amount of Rs. 85,000, again the company will withdraw a similar amount and so on.

Miller –Orr Cash management Model (1966)

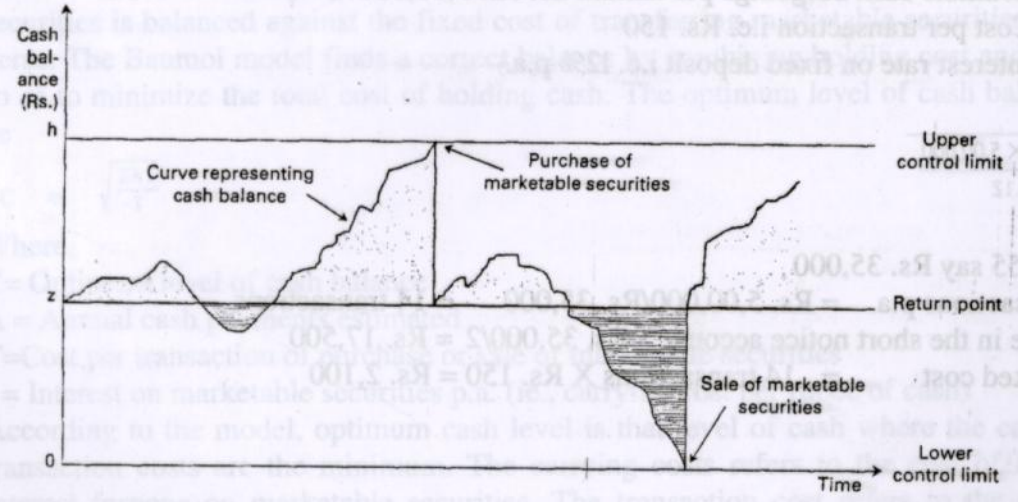
Miller –Orr Cash management Model assumes that the cash flow of the firm is assumed to be stochastic, i.e different amounts of cash payments are made on different points of time. It is assumed that the movements in cash balance occur randomly. Miller and Orr suggested a model with control limits which sets control points for time and size of transfers between an Investment Account and Cash Account. The model asserts that transfer money into or out of the account to return the balance to a predetermined 'normal point' whenever the actual balance went outside a lower or upper limit. The lower limit would be set by management, and the upper limit and return points by way of formulae which assume that cash inflows and outflows are random, their dispersion usually being assumed to repeat a pattern exhibited in the past. The model specifies the following two control limits:

h = Upper control limit, beyond the cash balance should not be carried.

0 = Lower control limit, sets the lower limit of cash balance, i.e. the firm should maintain cash resources at least to the extent of lower limit.

z = Return point for cash balance

Miller –Orr Cash management Model



The Miller-Orr model, will work as follows:

(i) When cash balance touched the upper control limit (h), securities are bought to the extent of Rs. (h-z).

(ii) Then the new cash balance is z.

(iii) When cash balance touches lower control limit (o), marketable securities to the extent of Rs. (z-o) will be sold.

(iv)Then the new cash balance again return to point z.

Assumptions

The basic assumptions of the model are:

(a) The major assumption with this model is that there is no underlying trend in cash balance over time.

(b) The optimal values of h' and 'z' depend not only on opportunity costs, but also on the degree of likely fluctuations in cash balances.

The model can be used in times of uncertainty and random cash flows. It is based on the principle that control limits can be set which when reached trigger off a transaction. The control limits are based on the day-to-day variability in cash flows and the fixed costs of buying and selling government securities.

Spread Between the Control Limits

$$= 3 \left(\frac{3/4 \times \text{Transaction Cost} \times \text{Variance of Cash Flows}}{\text{Interest Rate}} \right)^{1/3}$$

$$\text{Return Point} = \text{Lower Limit} + \frac{\text{Spread}}{3}$$

The higher the variability in cash flows and transaction cost, the wider and higher the control limits will be. Conversely, the higher the interest rate, the lower and closer they will become. Within the control limits, the cash balance fluctuates unpredictably. When it hits an upper or lower limit, action is taken by buying or selling securities to restore the balance to its normal level within control points. In applying the model one must set the lower limit for the cash balance. This could be zero or some minimum safety margin above zero.

Example 3

Lower control limit set =Rs. 1,000

Interest rate per day= O.025%

Standard deviation of daily cash flows (variance of Rs. 2, 50,000)= Rs. 500

Switching costs per transaction= Rs 20

Solution

$$= 3 \left(\frac{3/4 \times \text{Transaction Cost} \times \text{Variance of Cash Flows}}{\text{Interest Rate}} \right)^{1/3}$$

$$\text{Spread} = 3 \left(\frac{3/4 \times \text{Transaction Cost} \times \text{Variance of Cash Flows}}{\text{Interest Rate}} \right)^{1/3}$$

$$= 3 \left(\frac{3/4 \times 20 \times 2{,}50{,}000}{0.00025} \right)^{1/3} = \text{Rs. } 7{,}400$$

Upper Limit = Spread + Lower Limit

= 7,400 + 1,000 = Rs. 8,400

Return Point = Lower Limit + (1/3 × Spread)

= 1,000 + (1/3 × 7,400) = 1,000 + 2,467 = Rs. 3,467

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Lesson 11

Inventory Management

Inventories are stock of the product a company is manufacturing for sale and components that make up the product. The various forms in which inventories exist in a manufacturing company are: raw materials, work-in-process and finished goods.

• Raw materials are those basic inputs that are converted into finished product through the manufacturing process. Raw materials inventories are those units which have been purchased and stored for future productions.

• Work-in-process inventories are semi-manufactured products. They represent products that need more work before they become finished products for sale.

• Finished goods inventories are those completely manufactured products which are ready for sale. Stocks of raw materials and work-in-process facilitate production, while stock of finished goods is required for smooth marketing operations. Thus, inventories serve as a link between the production and consumption of goods.

The levels of three kinds of inventories for a firm depend on the nature of its business. A manufacturing firm will have substantially high levels of all three kinds of inventories, while a retail or wholesale firm will have a very high level of finished goods inventories and no raw material and work-in- progress inventories. Within manufacturing firms, there will be difference. Large heavy engineering companies produce long production - cycle products; therefore, they carry large inventories. On the other hand, inventories of a consumer product company will not be large because of short production cycle and fast turnover.

Firms also maintain a fourth kind of inventory, supplies or stores and spares. Supplies include office and plant cleaning materials like soap, brooms, oil, fuel, light bulbs etc. These materials do not directly enter production, but are necessary for production process. Usually, these supplies are small part of the total inventory and do not involve significant investment. Therefore, a sophisticated system of inventory control maynot be maintained for them.

Need to Hold Inventories

The question of managing inventories arises only when the company holds inventories. Maintaining inventories involves tying up of the company's funds and incurrence of storage and handling costs. If it is expensive to maintain inventories, why do companies hold inventories? There are three general motives for holding inventories.

1 Transactions motive: it emphasizes the need to maintain inventories to facilitate smooth production and sales operations.

2 precautionary motives: It necessitates holding of inventories to guard against the risk of unpredictable changes in demand and supply forces and other factors.

3 Speculative motives: It influences the decision to increase or reduce inventory levels to take advantage of price fluctuations.

A company should maintain adequate stock of materials for continues supply to the factory for an uninterrupted production. It is not possible for a company to procure raw material whenever it is needed. A time lag exists between demand for materials and its supply. Also, there exists uncertainty in procuring raw materials in time on many occasions. The procurement of materials may be delayed because of such factors as strike, transport disruption or short supply. Therefore, the firm should maintain sufficient stock of raw materials at a given time to streamline production. Other factors which may necessitate purchasing and holding of raw material

inventories are quantity discounts and anticipated price increase. The firm may purchase large quantities of raw materials than needed for the desired production and sales levels to obtain quantity discounts of bulk purchasing. At times, the firm would like to accumulate raw materials in anticipation of price rise.

Work-in-process inventory builds up because of the production cycle. Production cycle is the time span between introduction of raw material into production and emergence of finished product at the completion of production cycle. Till production cycle completes, stock of work-in-process has to be maintained. Efficient firms constantly try to make production cycle smaller by improving their production techniques.

Stock of finished goods has to be held because production and sales are not instantaneous. A firm cannot produce immediately when customers demand goods. Therefore, to supply finished goods on a regular basis, their stock has to be maintained. Stock of finished goods has also to be maintained for sudden demands from customers. In case the firm's sales are seasonal in nature, substantial finished goods inventories should be kept to meet the peak demand. Failure to supply products to customers, when demanded, would mean loss of the firm's sales to competitors. The level of finished goods inventories would depend upon the coordination between sales and production as well as on production time.

Objectives of Inventory Management

There are basically two objectives of inventory management which conflicting in nature:

-To maintain a large size of inventories of raw material and work-in-process for efficient and smooth production and of finished goods for uninterrupted sales operations.

-To maintain a minimum investment in inventories to maximise profitability.

Both excessive and inadequate inventories are not desirable. These are two danger points within which the firm should avoid. The objective of inventory management should be to determine and maintain optimum level of inventory investment. The optimum level of inventory will lie between the two danger points of excessive and inadequate inventories.

The firm should always avoid a situation of over investment or under-investment in inventories. The major dangers of over investment are: (a) unnecessary tie-up of the firm's funds and loss of profit, (b) excessive carrying costs, and (c) risk of liquidity. The excessive level of inventories consumes funds of the firm, which cannot be used for any other purpose, and thus, it involves an opportunity cost.

The carrying costs, such as the costs of storage, handling, insurance, recording and inspection, also increase in proportion to the volume of inventory. These costs will impair the firm's profitability further. Excessive inventories carried for long-period increase chances of loss of liquidity. It may not be possible to sell inventories in time and at full value. Raw materials are generally difficult to sell as the holding period increases. There are exceptional circumstances where it may pay to the company to hold stocks of raw materials. This is possible under conditions of inflation and scarcity.

Work-in- process is far more difficult to sell. Similarly, difficulties may be faced to dispose off finished goods inventories as time lengthens. The downward shifts in market and the seasonal factors may cause finished goods to be sold at low prices. A danger of carrying excessive inventory is the physical deterioration of inventories while in storage. In case of certain goods or raw materials deterioration occurs with the passage of time, or it may be due to mishandling and improper storage facilities. These factors are within the control of management; unnecessary investment in inventories can, thus, be cut down.

Maintaining an inadequate level of inventories is also dangerous. The consequences of under-investment in inventories are: (a) production hold-ups and (b) failure to meet delivery commitments. Inadequate raw materials and work-in-process inventories will result in frequent production interruptions. Similarly, if finished goods inventories are not sufficient to meet the demand of customers regularly, they may shift to competitors, which will amount to a permanent loss to the firm.

The aim of inventory management, thus, should be to avoid excessive and inadequate levels of inventories and to maintain sufficient inventory for the smooth production and sales operations. Efforts should be made to place an order at the right time with the right source to acquire the right quantity at the right price and quality. An effective inventory management should

- ensure a continuous supply of raw materials to facilitate uninterrupted production.
- maintain sufficient stocks of raw materials in periods of short supply and anticipate price changes.
- maintain sufficient finished goods inventory for smooth sales operation, and efficient customer service.
- minimise the carrying cost and time, and
- control investment in inventories and keep it at an optimum level.

Inventory Management Techniques

In managing inventories, the firm's objective should be in consonance with the shareholder wealth maximisation principle. To achieve this, the firm should determine the optimum level of inventory. Efficiently controlled inventories make the firm flexible. Inefficient inventory control results in unbalanced inventory and inflexibility—the firm may sometimes run out of stock and sometimes may pile up unnecessary stocks. This increases the level of investment and makes the firm unprofitable.

To manage inventories efficiency, answers should be sought to the following two questions:

- How much should be ordered?
- When should it be ordered?

The first question, how much to order, relates to the problem of determining economic order quantity (EOQ), and is answered with an analysis of costs of maintaining certain level of inventories. The second question, when to order, arises because of uncertainty and is a problem of determining the re-order point.

Techniques of inventory management

Effective inventory management requires an effective control over inventories. Inventory control refers to a system which ensures supply of required quantity and quality of inventories at the required time and at the same time prevents unnecessary investment in inventories. The techniques of inventory control/inventory management are as follows:

1. **Determination of Economic Order Quantity (EOQ)**

Determination of the quantity for which the order should be placed is one of the important problems concerned with efficient inventory management. Economic Order Quantity refers to the size of the order which gives maximum economy in purchasing any item of raw material or finished product. It is fixed mainly after taking into account the following costs.

(i) Ordering cost: It is the cost of placing an order and securing the supplies. It varies from time to time depending upon the number of orders placed and the number of items ordered. The more

frequently the orders are placed, and fewer the quantities purchased on each order, the greater will be the ordering cost and vice versa.

(ii) Inventory carrying cost: It is the cost of keeping items in stock. It includes interest on investment, obsolescence losses, store-keeping cost, insurance premium, etc. The larger the value of inventory, the higher will be the inventory carrying cost and vice versa.

The former cost may be referred as the "cost of acquiring" while the latter as the "cost of holding" inventory. The cost of acquiring decreases while the cost of holding increases with every increase in the quantity of purchase lot. A balance is, therefore, struck between the two opposing factors and the economic ordering quantity is determined at a level for which aggregate of two costs is the minimum.

Formula:

$$Q = \sqrt{\frac{2U \times P}{S}}$$

where

Q = Economic ordering quantity

U = Quantity (units) purchased in a year (month)

P = Cost of placing an order

S = Annual (Monthly) cost of storage of one unit.

Example1

A, a refrigerator manufacturer, purchases 1,600 units of a certain components from B. His annual usage is 1,600 units. The order placing cost is Rs. 100 and the cost of carrying one unit for a year is Rs. 8. Calculate the Economic Ordering Quantity and tabulate your results.

Solution:

$$Q = \sqrt{\frac{2U \times P}{S}}$$

$$= \sqrt{\frac{2 \times 1,600 \times 100}{8}}$$

$$= \sqrt{40,000} = 200 \text{ units}$$

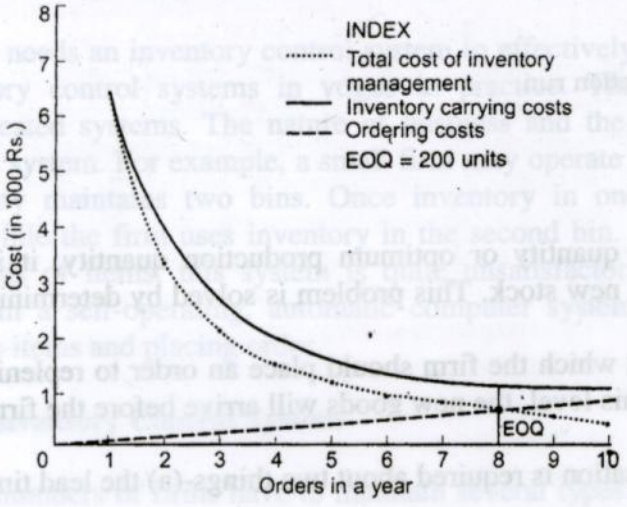
The EOQ can also be calculated by Tabular method as shown below:-

TABLE SHOWING THE ECONOMIC ORDERING QUANTITY

Annual requirement	*Orders per year*	*Units per order*	*Order placing costs*	*Average inventory in units (50% of order placed)*	*Carrying costs*	*Total annual costs*
			Rs.	Rs.	Rs.	Rs.
1,600	1	1,600	100	800	6,400	6,500
	2	800	200	400	3,200	3,400
	3	533	300	267	2,136	2,436
	4	400	400	200	1,600	2,000
	5	320	500	160	1,280	1,780
	6	267	600	134	1,072	1,672
	7	229	700	115	920	1,620
	8	200	800	100	800	1,600
	9	178	900	89	712	1,612
	10	160	1,000	80	640	1,640

The above table shows that total cost is the minimum when each order is of 200 units. Therefore, economic ordering quantity is 200 units only.

A graphic presentation of the economic ordering quantity on the basis of figures given in the above table has been given below:



2 Determination of Optimum Production Quantity

The EOQ Model can be extended to production runs to determine the 'optimum production quantity'. The two costs involved in this process are:

(i) Set up cost and (ii) Inventory carrying cost.

The set-up cost is of the nature of fixed cost and is to be incurred at the time of commencement of each production run. Larger the size of the production run, lower will be the set-up cost per unit. However, the carrying cost will increase with increase in the size of the production run. Thus, there is an inverse relationship between the set-up cost and inventory carrying cost. The optimum production size is at that level where the total of the set-up cost and the inventory carrying cost is the minimum. In other words, at this level the two costs will be equal.

The formula for EOQ can also be used for determining the optimum production quantity as given below:

$$E = \sqrt{\frac{2U \times P}{S}}$$

where

E = Optimum Production Quantity

U = Annual (Monthly) Output

P = Set-up cost for each production run

S = Cost of carrying month

Example 2

Calculate the optimum production quantity per production run from the following information:

Estimated annual production	90,000 units
Set-up cost per production run	Rs. 50
Carrying cost per unit per annum	Re. 1

Solution:

$$E = \sqrt{\frac{2U \times P}{S}}$$

$$= \sqrt{\frac{2 \times 90{,}000 \times 50}{1}}$$

= 3,000 units per production run.

3. Determination of Re-order Level

Having determined the economic order quantity or optimum production quantity, it is also important to decide when to order for the new stock. This problem is solved by determining the re-order level.

Re-order level is the level of inventory at which the firm should place an order to replenish the inventory. In case, the order is placed at this level, the new goods will arrive before the firm runs out of goods to sell.

In order to determine reorder level, information is required about two things-(a) the lead time and (b) the usage rate.

The term Lead Time refers to the time normally taken in receiving the delivery of inventory after the order has been placed. In case there is no uncertainty about the usage rate and the lead time, the re-order level can be determined by simply applying the following formula:

Re-order Level = Average Usage x Lead Time

For example, if the lead time is 3 weeks and the average usage 50 units per week, the reorder level can be computed as follows:

Re-order Level = Lead Time x Average Usage

= 3 weeks x 50 units = 150 units.

It may be noted that if the economic order quantity in the above case is 500 units and there is no lead time, the economic order quantity would have been sufficient for 10 weeks and the order would have been placed only at the end of the 10th week—the time when the recorder quantity reaches the zero level. Since in the above problem, the lead time is 3 weeks and, therefore, the order should be placed at the end of the 7th week when only 150 units are left.

Safety stock

In the example given above, the reorder level was computed presuming that there is no uncertainty regarding the usage as well as the lead time. However, in actual practice, it is almost impossible to correctly predict both of them. The actual usage as well as the lead time may be different form the normal usage or the normal lead time. In order to guard against such a contingency, the firm maintains a safety stock—the minimum of buffer stock—as a cushion against possible increase in usage or delay in delivery time. The level of safety stock can be calculated by applying the following formula:

Safety Stock = Average Usage x Period of Safety Stock.

For example, if the usage rate is 50 units per week and the firm wants to hold sufficient inventory for at least one week of production the amount of safety stock will be 50 units.

The formula for determining the re-order level when safety stock is maintained will be as follows:

Re-order Level = Lead Time x Average Usage + Safety Stock.

Inventory Control Systems

A firm needs an inventory control system to effectively manage its inventory. There are several inventory control systems in vogue in practice. They range from simple systems to very complicated systems. The nature of business and the size dictate the choice of an inventory control system. For example, a small firm may operate a two-bin system. Under this system, the company maintains two bins. Once inventory in one bin is used, an order is placed, and meanwhile the firm uses inventory in the second bin. For a large departmental store that sells hundreds of items, this system is quite unsatisfactory. The departmental store will have to maintain a self-operating, automatic computer system for tracking the inventory position of various items and placing order.

ABC Inventory Control System

Large numbers of firms have to maintain several types of inventories. It is not desirable to keep the same degree of control on all the items. The firm should pay maximum attention to those items whose value is the highest. The firm should, therefore, classify inventories to identify which items should receive the most effort in controlling. The firm should be selective in its approach to control investment in various types of inventories. This analytical approach is called the ABC analysis and tends to measure the significance of each item of inventories in terms of its value. The high-value items are classified as 'A items' and would be under the tightest control. 'C items' represent relatively least value and would be under simple control. 'B items' fall in between these two categories and require reasonable attention of management. The ABC analysis concentrates on important items and is also known as control by importance and exception (CIE). As the items are classified in the importance of their relative value, this approach is also known as proportional value analysis (PVA).

The following steps are involved in implementing the ABC analysis:

- Classify the items of inventories, determining the expected use in units and the price per unit for each item.
- Determine the total value of each item by multiplying the expected units by its units price.
- Rank the items in accordance with the total value, giving first rank to the item with highest total value and so on.
- Compute the ratios (percentage) of number of units of each item to total units of all items and the ratio of total value of each item to total value of all items.
- Combine items on the basis of their relative value to form three categories—A, B and C.

Just-in-Time (JIT) Systems

Japanese firms popularized the just-in-time (JIT) system in the world. In a JIT system material or the manufactured components and parts arrive to the manufacturing sites or stores just few hours before they are put to use. The delivery of material is synchronized with the manufacturing cycle and speed. JIT system eliminates the necessity of carrying large inventories, and thus, saves carrying and other related costs to the manufacturer. The system requires perfect understanding and coordination between the manufacturer and suppliers in terms of the timing of delivery and quality of the material. Poor quality material or components could halt the production. The JIT inventory system complements the total quality management (TQM). The success of the system depends on how well a company manages its suppliers. The system puts tremendous pressure on

suppliers. They will have to develop adequate systems and procedures to satisfactory meet the needs of manufacturers.

Out-Sourcing

A few years ago there was a tendency on the parts of many companies to manufacture all components in-house. Now more and more companies are adopting the practice out-sourcing. Out-sourcing is a system of buying parts and components from outside rather than manufacturing them internally. Many companies develop a single source of supply, and many others help developing small and middle size suppliers of components that they require. Tata Motors has; for example, develop number of ancillary units around its manufacturing sites that supply parts and components to its manufacturing plants. With the help of Tata Motors the, ancillaries are able to maintain the high quality of the manufactured components. The car manufacturing company, Maruti, which is now controlled by Suzuki of Japan has the similar system of supply.

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Lesson 12

Receivables Management

The term receivables are defined as 'debt owed to the firm by customers arising from sale of goods or services in the ordinary course of business. When a firm makes an ordinary sale of goods or services and does not receive payment, the firm grants trade credit and creates accounts receivable which could be collected in the future. Receivables management is also called trade credit management. Thus, accounts receivable represent an extension of credit to customers, allowing them a reasonable period of time in which to pay for the goods received.

The sale of goods on credit is an essential part of the modern competitive economic systems. In fact, credit sales and, therefore, receivables are treated as a marketing tool to aid the sale of goods. The credit sales are generally made on open account in the sense that there are no formal acknowledgements of debt obligations through a financial instrument. As a marketing tool, they are intended to promote sales and thereby profits. However, extension of credit involves risk and cost. Management should weigh the benefits as well as cost to determine the goal of receivables management. The objective of receivables management is 'to promote sales and profits until that point is reached where the return on investment in further funding receivables is less than the cost of funds raised to finance that additional credit (i.e. cost of capital). The specific costs and benefits which are relevant to the determination of the objectives of receivables management are examined below.

The major categories of costs associated with the extension of credit and accounts receivable are: (i) collection cost, (ii) capital cost, (iii) delinquency cost, and (iv)default cost.

(i)Collection Cost: Collection costs are administrative costs incurred in collecting the receivables from the customers to whom credit sales have been made. Included in this category of costs are:

(a) Additional expenses on the creation and maintenance of a credit department with staff, accounting records, stationary, postage and other related items.

(b) Expenses involved in acquiring credit information either through outside specialist agencies or by the staff of the firm itself. These expenses would not be incurred if the firm does not sell on credit.

(ii)Capital Cost: The increased level of accounts receivable is an investment in assets. They have to he financed thereby involving a cost. There is a time-lag between the sale of goods to and payment by, the customers. Meanwhile, the firm has to pay employees and suppliers of raw materials, thereby implying that the firm should arrange for additional funds to meet its own obligations while waiting for payment from its customers. The cost on the use of additional capital to support credit sales, which alternatively could be profitably employed elsewhere, is, therefore, a part of the cost of extending credit or receivables.

(iii)Delinquency Cost: This cost arises out of the failure of the customers to meet their obligations when payments on credit sales become due after the expiry of the credit period. Such costs are called delinquency costs. The important components of this cost are:

(a) blocking-up of funds for an extended period.

(b) cost associated with steps that have to be initiated to collect the overdues, such as, reminders and other collection efforts, legal charges, where necessary, and so on.

(iv)Default Cost: Finally, the firm may not be able to recover the overdues because of the inability of the customers. Such debts are treated as bad debts and have to be written off as they cannot be realised. Such costs are known as default costs associated with credit sales and accounts receivable.

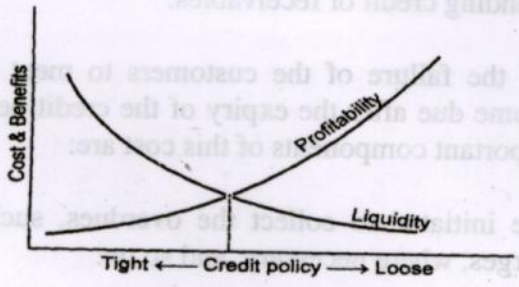
Purpose of Receivables

As indicated in the preceding pages, accounts receivable are created because of credit sales. Hence, the purpose of receivables is directly connected with the objectives of making credit sales. The objectives of credit sales are as follows:

- Achieving growth in sales: If a firm sells goods on credit, it will generally be in a position to sell more goods than if it insisted on immediate cash payment. This is because many customers are either not prepared or not in a position to pay cash when they purchase the goods. The firm can sell goods to such customers, in case it resorts to credit sales.
- Increasing profits: Increase in sales results in higher profits for the firm not only because of increase in the volume of sales but also because of the firm charging a higher margin of profit on credit sales as compared to cash sales.
- Meeting competition: A firm may have to resort to granting of credit facilities to its customers because of similar facilities being granted by the competing firms to avoid the loss of sales from customers who would buy elsewhere if they did not receive the expected credit.
- The overall objective of committing funds to accounts receivable is to generate a large flow of operating revenue and hence profit than what would be achieved in the absence of no such commitment.

Optimum Size of Receivables

The optimum investment in receivables will be at a level where there is a trade-off between costs and profitability. When the firm resorts to a liberal credit policy, the profitability of the firm increases on account of higher sales. However, such a policy results in increased investment in receivables, increased chances of bad debts and more collection costs. The total investment in receivables increases and, thus, the problem of liquidity is created. On the other hand, a stringent credit policy reduces the profitability but increases the liquidity of the firm. Thus, optimum credit policy occurs at a point where there is a "trade-off" between liquidity and profitability as shown in the chart below.



Credit Policy variables

In establishing an optimum credit policy, the financial manager must consider the important decision variables which influence level of receivables. As stated in the preceding section, the major controllable decision variables include the following:

- Credit standards and analysis
- Credit terms
- Collection policy and procedures

The financial manager or the credit manager may administer credit policy of a firm. It should, however, be appreciated that credit policy has important implications for the firm's production, marketing and finance functions. Therefore, it is advisable that a committee that consists of executives of production, marketing and finance departments formulates the firm's credit policy. Within the framework of the credit policy, as laid down by this committee, the financial or credit manager should ensure that the firm's value of share is maximized.

The most difficult part of the analysis of impact of change in the credit policy variables is the estimation of sales and costs. Even if sales and costs can be estimated, it would be difficult to establish an optimum credit policy, as the best combination of the variables of credit policy is quite difficult to obtain. For these reasons, the establishment of credit policy is a slow process in practice. A firm will change one or two variables at a time and observe the effect. Based on the actual experience, variables may be changed further, or change may be reversed. It should also be noted that the firm's credit policy is greatly influenced by economic conditions. As economic conditions change, the credit policy of the firm may also change. Thus, the credit policy decision is not one time static decision. The impacts of changes in the major decision variables of credit policy are discussed below.

Credit Standards

Credit standards are the criteria which a firm follows in selecting customers for the purpose of credit extension. The firm may have tight credit standards; that is, it may sell mostly on cash basis, and may extend credit only to the most reliable and financially strong customers. Such standards will result in no bad-debt losses, and less cost of credit administration. But the firm may not be able to expand sales. The profit sacrificed on lost sales may be more than the costs saved by the firm. On the contrary, if credit standards are loose, the firm may have larger sales. But the firm will have to carry larger receivable. The costs of administering credit and bad-debt losses will also increase. Thus, the choice of optimum credit standards involves a trade off between incremental return and incremental costs.

Credit analysis

Credit standards influence the quality of the firm's customers. There are two aspects of the quality of customers: (i) the time taken by customers to repay credit obligation and (ii) the default rate. The average collection period (ACP) determines the speed of payment by customers. It measures the number of days for which credit sales remain outstanding. The longer the average collection period, the higher the firm's investment in accounts receivable. Default rate can be measured in terms of bad-debt losses ratio-the proportion of uncollected receivable. Bad-debt losses ratio indicates default risk. Default risk is the likelihood that a customer will fail to repay the credit obligation. On the basis of past practice and experience,

the financial or credit manager should be able to form a reasonable judgment regarding the chances of default. To estimate the probability of default, the financial or credit manager should consider three C's: (a) character, (b) capacity, and (c) condition.

- Character refers to the customer's willingness to pay.
- Capacity refers to the customer's ability to pay. Capacity is evaluated by the financial position of the firm as indicated by analysis of ratios
- Condition refers to the prevailing economic and other conditions which may affect the customers' ability to pay.
-

Credit terms

The stipulations under which the firm sells on credit to customers are called credit terms. These stipulations include: (a) the credit period, and (b) the cash discount.

Credit period

The length of time for which credit is extended to customers is called the credit period. It is generally stated in terms of a net date. For example, if the firm's credit terms are 'net 35' it is expected that customers will repay credit obligation not later than 35 days. A firm's credit period may be governed by the industry norms. But depending on its objective, the firm can lengthen the credit period. On the other hand, the firm may tighten its credit period if customers are defaulting too frequently and bad-debt losses are building up.

A firm lengthens credit period to increase its operating profit through expanded sales. However, there will be net increase in operating profit only when the cost of extended credit period is less than the incremental operating profit. With increased sales and extended credit period, investment in receivable would increase. Two factors cause this increase:

(a) Incremental sales result in incremental receivable and

(b) Existing customers will take more time to repay credit obligation (i.e., the collection period will increase), thus increasing the level of receivable.

Cash Discounts

A cash discount is a reduction in payment to customers to induce them to repay credit obligations a specified period of time, which will be less than the credit period. It is usually expressed as a percentage of sales .Cash discount terms indicate the rate of discount and the period for which it is available. If the customer does not avail the offer, he must make payment within the normal credit period. In practice, credit terms would include: (a) the rate of cash discount, (b) the cash discount period, and (c) the net credit period. For example, credit terms may be expressed as '2 /10; net 30.This means that a 2 per cent discount will be granted if the customer pays within 10 days; if he does not avail the offer he must make payment within 30 days.

A firm uses cash discount as a tool to increase sales and accelerate rate collections from customers. Thus, the level of receivable and associated costs may be reduced. The cost involved is the discounts taken by customers.

Collection Policy and Procedures

A collection policy is needed because all customers do not pay the firms bills in time. Some customers are slow-payers while some are non-payers. The collection efforts should, therefore, aim at accelerating collections from slow-payers and reducing bad- debt losses. A collection policy should ensure prompt and regular collection. Prompt collection is needed for fast turnover of working capital, keeping collection costs and bad-debts within limits and

maintaining collection efficiency. Regularity in collections keeps debtors alert, and they tend to pay their dues promptly.

The collection policy should lay down clear-cut collection procedures. The collection procedures for past dues or delinquent accounts should also be established in unambiguous terms. The slow-paying customers should be handled very tactfully. Some of them may be permanent customers. The collection process initiated quickly, without giving any chance to them, may antagonise them, and the firm may lose them to competitors.

The responsibility for collection and follow-up should be explicitly fixed. It may be entrusted to the accounts or sales department, or to a separate credit department. The co-ordination between accounts and sales departments is necessary and must be ensured formally. The accounting department maintains the credit records and information. If it is responsible for collection, it should consult the sales department before initiating an action against non-paying customers. Similarly, the sales department must obtain past information about a customer from the accounting department before granting credit to him.

Though collection procedures should be firmly established, individual cases should be dealt with on their merits. Some customers may be temporarily in tight financial position and in spite of their best intentions may not be able to pay on due date. This may be due to recessionary conditions, or other factors beyond the control of the customers. Such cases need special considerations. The collection procedure against them should be initiated only after they have overcome their financial difficulties and do not intend to pay promptly.

The firm should decide about offering cash discount for prompt payment. Cash discount is a cost to the firm for ensuring faster recovery of cash. Some customers fail to pay within the specified discount period, yet they may make payment after deducting the amount of cash discount. Such cases must be promptly identified and necessary action should be initiated against them to recover the full amount.

In practice, companies may take certain precautions vis-à vis collections. Some companies require their customers to give pre signed cheques. Bills discounting is another practice in India. Unfortunately, it is not very popular with a number of companies. Some companies provide for penal rate of interest for debtors who fail to pay in time.

Monitoring Receivables

A firm needs to continuously monitor and control its receivable to ensure the success of collection efforts. Two traditional methods of evaluating the management of receivable are: (1) average collection period (ACP) and (2) aging schedule.

Average Collection Period

$$\text{Average Collection Period} = \frac{\text{Debtors} \times 360}{\text{Credit sales}}$$

The average collection period so calculated is compared with the firm's stated credit period to judge the collection efficiency. For example, if a firm's stated credit period is 25 days and the actual collection period is 40 days, then one may conclude that the firm has a lax system of collection. An extended collection period delays cash inflows, impairs the firm's liquidity position and increases the chances of bad-debt losses. The average collection period measures the quality of receivable since it indicates the speed of their collect ability.

There are two limitations of this method. First, it provides an average picture of collection experience and is based on aggregate data. For control purposes, one needs specific

information about the age of outstanding receivables. Second, it is susceptible to sales variations and the period over which sales and receivables have been aggregated. Thus, average collection period cannot provide a very meaningful information about the quality of outstanding receivable.

Aging Schedule

The acing schedule removes one of the limitations of the average collection period. It breaks down receivables according to the length of time for which they have been outstanding.

If the firm's stated credit period is 25 days, the aging s schedule indicates that 50 per cent of receivables remain outstanding beyond this period. A significant amount of receivables remains uncollected much longer than the firm's credit period. Thus, aging schedule provides more information about the collection experience. It helps to spot out the slow-paying debtors. However, it also suffers from the problem of aggregation and does not relate receivables to sales of the same period.

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PROBLEMS AND SOLUTIONS OF EXAMINATIONS QUESTIONS

DELHI UNIVERSITY EXAMINATION QUESTIONS

Q.1. A company requires an initial investment of Rs. 40,000. The estimated net cash flows are as follows:

Year	1	2	3	4	5	6	7	8	9	10
Net cash flow	7,000	7,000	7,000	7,000	7,000	8,000	10,000	15,000	10,000	4,000

(*figures in Rupees*)

Using 10% as the cost of capital (rate of discount), determine the following:

(*i*) Pay-back period (*ii*) Net Present Value and (*iii*) Internal Rate Return.

(*D.U.B. Com. (H) 1998*)

SOLUTION: (*i*) Calculation of Payback Period

Year	*CFAT*	*Cumulative CFAT*
	Rs.	Rs.
1	7,000	7,000
2	7,000	14,000
3	7,000	21,000
4	7,000	28,000
5	7,000	35,000
6	8,000	43,000
7	10,000	53,000
8	15,000	68,000
9	10,000	78,000
10	4,000	8,000

From the above details, it can be observed that payback period lies between 5th and 6th year. The precise value is calculated as under:

$$\text{Payback period} = 5 + \frac{(40,000 - 35,000)}{8,000}$$

$$= 5 + \frac{5,000}{8,000} = 5 + 0.625 = 5.625 \text{ years.}$$

(*ii*) Calculation of Net Present Value (using 10% cost of capital)

Year	*CFAT*	*PVF @ 10%*	*Present Value*
	Rs.		Rs.
1	7,000	0.909	6,363
2	7,000	0.826	5,782
3	7,000	0.751	5,257
4	7,000	0.683	4,781
5	7,000	0.621	4,347
6	8,000	0.564	4,512
7	10,000	0.513	5,130
8	15,000	0.467	7,005
9	10,000	0.424	4,240
10	4,000	0.386	1,544
	PV of Cash Inflows		48,961
	Less: Initial Cash Outflow		40,000
	NPV		8,961

(*iii*) Calculation of Internal Rate of Return (IRR)

$$\text{Fake Payback Period} = \frac{\text{Initial Cash Outlay}}{\text{Average Annual Cash Flow}}$$

Average Annual Cash Flow

$$= \frac{7,000+7,000+7,000+7,000+7,000+8,000+10,000+15,000+10,000+4,000}{10}$$

$$= \frac{82,000}{10} = \text{Rs. } 8,200$$

$$\text{Fake Payback Period} = \frac{40,000}{8,200} = 4.878 \text{ years}$$

From Table A-4, the value closest to the fake payback period of 4.878 against 10 years is 16% Hence, our first discount rate is 16%.

NPV at 16% Discount Rate

Year	*Inflows*	*PVF at 16%*	*Present Value*
	Rs.		Rs.
1	7,000	.862	6,034
2	7,000	.743	5,201
3	7,000	.641	4,487
4	7,000	.552	3,864

5	7,000	.476	3,332
6	8,000	.410	3,280
7	10,000	.354	3,540
8	15,000	.305	4,575
9	10,000	.263	2,630
10	4,000	.227	908
	PV of Cash Inflows		37,851
	Less: PV of Cash Outflow		40,000
	NPV		(–) 2,149

Since NPV at 16% discount rate is negative, second rate will be taken lower than 16%. Let it be 14%.

NPV at 14% Discount Rate

Year	*Inflows*	*PVF at 14%*	*Present Value*
	Rs.		Rs.
1	7,000	.877	6,139
2	7,000	.769	5,383
3	7,000	.675	4,725
4	7,000	.592	4,144
5	7,000	.519	3,633
6	8,000	.456	3,648
7	10,000	.400	4,000
8	15,000	.351	5,265
9	10,000	.308	3,080
10	4,000	.270	1,080
	PV of Cash Inflows		41,097
	Less: PV of Cash Outflow		40,000
	NPV		1,097

$$\text{IRR} = \text{Lower Rate} + \frac{\text{Lower Rate NPV}}{\text{Lower Rate NPV} - \text{Higher Rate NPV}} \times \text{Difference in Rates}$$

$$= 14 + \frac{1,097}{1,097 - (-2,149)} \times 2$$

$$= 14 + \frac{1,097}{3,246} \times 2 = 14.676\%$$

Q.2. Management of Talash Ltd. has the option to buy either Machine A or Machine B. Machine A has a cost of Rs. 75,000. Its expected life is 6 years with no salvage value at the end. It would generate net cash flows of Rs. 20,000 per year. Machine B on the ohter hand would cost Rs. 50,000. Its expected life is 6 years with no salvage value at the end. It would generate net cash flows of Rs. 15,000 per year. Assuming that the cost of capital of Talash Ltd. is 10 per cent, you are required to calculate:

(*i*) Net Present Value of each machine.

(*ii*) Internal Rate of Return for each machine.

(*iii*) Which machine should be recommended and why? *(D.U.B. Com. Hons. 1999)*

SOLUTION:

Calculation of Net Present Value:

	Machine A	*Machine B*
Annual Cash Inflows	Rs. 20,000	Rs. 15,000
Period	6 years	6years
PVAF $_{(10\%, 6Y)}$ (as per Table A-4)	4.355	4.355
Present Value	20,000 × 4.355 = 87,100	15,000 × 4.355 = 65,325
Less: Cash Outflow	75,000	50,000
NPV	12,100	15,325

Calculation of Internal Rate of Return:

	Machine A	*Machine B*
Cash Outflow	Rs. 75,000	Rs. 50,000
Annual Cash Inflows	20,000	15,000
Fake Payback period	75,000 ÷ 20,000 = 3.750	50,000 ÷ 15,000 = 3.333
Using Table 4, we have discount rates of 15% and 16% for Machine A and 19% and 20% for Machine B.		
Relevant PVAF (as per Table A-4)	15% – 3.784 16% – 3.685	19% – 3.410 20% – 3.326
Interpolation	$15\% + \frac{3.784-3.750}{3.784-3.685} \times 1$ = 15.3%	$19\% + \frac{3.410-3.333}{3.410-3.326} \times 1$ = 19.91%

Both the NPV and IRR, are higher for Machine B, hence the firm should buy Machine B.

Q.3. A Company is considering to purchase a machine. Two machines A and B are available each costing Rs. 5,00,000. In comparing the profitability of machine, a discount rate of 10% is to be used. Earnings after taxation are expected to be as follows :

Year	Machine A	Machine B
1	1,50,000	50,000
2	2,00,000	1,50,000
3	2,50,000	2,00,000
4	1,50,000	3,00,000
5	1,00,000	2,00,000

You are required to indicate which of the machines would be profitable using the following methods of ranking investment proposals :

(*i*) Payback method

(*ii*) Net present value method

(*iii*) Return on investment method. *(D.U.B. Com. Hons. 2000)*

SOLUTION:

In this question, earnings after taxation are given. In order to calculate CFAT, we have to add depreciation which is 5,00,000 ÷ 5 = Rs. 1,00,000 per year.

(*i*) Calculation of Payback period

Year	Machine A		Machine B	
	CFAT	Cumulative CFAT	CFAT	Cumulative CFAT
1	2,50,000	2,50,000	1,50,000	1,50,000
2	3,00,000	5,50,000	2,50,000	4,00,000
3	3,50,000	9,00,000	3,00,000	7,00,000
4	2,50,000	11,50,000	4,00,000	11,00,000
5	2,00,000	13,50,000	3,00,000	14,00,000

$$\text{Payback Period} = E + \frac{B}{C}$$

Where, E stands for number of years immediately preceding the year of final recovery.

B stands for balance amount sitll to be recovered.

C stands for cash flow during the year or final recovery.

Initial Investment in Machine A as well as in Machine B = Rs. 5,00,000.

$$\therefore \text{ PB for Machine A } = 1 + \frac{5,00,000 - 2,50,000}{3,00,000} = 1 + 0.83 = 1.83 \text{ years.}$$

$$\text{PB for Machine B } = 2 + \frac{5,00,000 - 4,00,000}{3,00,000} = 2 + 0.33 = 2.33 \text{ years.}$$

(ii) Calculation of NPV :

Year	*Machine A*	*Machine B*	*PV @ 10%*	*MachineA*	*Machine B*
	CFAT	*CFAT*		*PV*	*PV*
1	2,50,000	1,50,000	0.909	2,27,250	1,36,350
2	3,00,000	2,50,000	0.826	2,47,800	2,06,500
3	3,50,000	3,00,000	0.751	2,62,850	2,25,300
4	2,50,000	4,00,000	0.683	1,70,750	2,73,200
5	2,00,000	3,00,000	0.621	1,24,200	1,86,300
		Sum of Cash Inflows		10,32,850	10,27,650
		Less: Cash Outflows		5,00,000	5,00,000
		NPV		5,32,850	5,27,650

∴ Machine A shall be preferred because of its higher NPV.

(iii) Calculation of Return on Investment :

	Machine A	*Machine B*
	Rs.	Rs.
Total Earnings in 5 years	8,50,000	9,00,000
Average Earnings	8,50,000 ÷ 5 = 1,70,000	9,00,000 ÷ 5 = 1,80,000
Average Investment	5,00,000 ÷2 = 2,50,000	5,00,000 ÷ 2,50,000
ARR	$\frac{1,70,000}{2,50,000} \times 100 = 68\%$	$\frac{1,80,000}{2,50,000} \times 100 = 72\%$

Machine B should be preferred because it has higher ARR of 72%.

Q.4. ITC Ltd. has decided to purchase a machine to augment the company's installed capacity to meet the growing demand for the products. There are three machines under consideration of the management. The relevant details including estimated yearly expenditure and sales are given below. All sales are on cash. Corporate Income Tax rate is 40%.

	Machine 1	*Machine 2*	*Machine 3*
Initial Investment required	Rs. 3,00,000	Rs. 3,00,000	Rs. 3,00,000
Estimated Annual Sales	5,00,000	4,00,000	4,50,000
Cost of Production (estimated):			
Direct Materials	40,000	50,000	48,000
Direct Labour	50,000	30,000	36,000
Factory Overheads	60,000	50,000	58,000
Administration costs	20,000	10,000	15,000
Selling and distribution costs	10,000	10,000	10,000

The economic life of Machine 1 is 2 years, while it is 3 years for the other two. The scrap values are Rs. 40,000, Rs. 25,000, and Rs. 30,000 respectively.

You are required to find out the most profitable investment based on 'Payback Method'.

SOLUTION:

Calculation of Payback Period of Machines:

	Machine I	*Machine 2*	*Machine 3*
Initial Investment (A)	Rs. 3,00,000	Rs. 3,00,000	Rs. 3,00,000
Sales (B)	5,00,000	4,00,000	4,50,000
Cost :			
Direct Materials	40,000	50,000	48,000
Direct Labour	50,000	30,000	36,000
Factory Overhead	60,000	50,000	58,000
Depreciation	1,30,000	91,667	90,000
Administration Cost	20,000	10,000	15,000
Selling and distribution cost	10,000	10,000	10,000
Total Cost (C)	3,10,000	2,41,667	2,57,000
Profit before Tax (B – C)	1,90,000	1,58,333	1,93,000
Less: Tax 40%	76,000	63,333	77,200
Profit after Tax	1,14,000	95,000	1,15,800
Add : Depreciation	1,30,000	91,667	90,000
Net Cash Flow (D)	2,44,000	1,86,667	2,05,800
Payback period (years) (A ÷ D)	1.23	1.61	1.46

Machine 1 has lowest payback period, hence it may be preferred over the other two Machine.

Q.5. The Income Statement of *X* Ltd. for the current year is as follows:

	Amount	*Amount*
	Rs.	Rs.
Sales		7,00,000
Less: Costs: Matetial	2,00,000	
Labour	2,50,000	
Other Operating Cost	80,000	
Depreciation	70,000	6,00,000
Profit before Taxes		1,00,000
*Less:*Taxes @ 40%		40,000
Profit after Taxes		60,000

The Plant Manager proposes to replace an existing machine by another machine costing Rs. 2,40,000. The new machine will have 8 years life having no salvage value. It is estimated that new machine will reduce the labour costs by Rs. 50,000 per year. The old machine will realise Rs. 40,000. Income statement does not include the depreciation on old machine (the one that is going to be replaced) as the same had

been fully depreciated for tax purposes last year though it will still continue to function, if not replaced, for a few years more. It is believed that there will be no change in other expenses and revenue of the firm due to its replacement. The company requires an After-Tax Return of 10%. The rate of tax applicable to company's income is 40%. Should the company buy the new machine, assuming that the company follows straight line method of depreciation and the same is allowed for tax purposes?

(D.U.B.Com. Hons, 2001)

SOLUTION:

Calculation of Cash Outflows:

	Amount	*Amount*
	Rs.	Rs.
Cost of New Machine		2,40,000
Less: Proceeds from sale of existing machine		40,000
		2,00,000
Add: Tax Liability on profit on sale of existing machine:		
Book Value	NIL	
Sale Value	40,000	
Profit on Sale	40,000	
Tax @ 40% on Rs. 40,000		16,000
Net Outflow		2,16,000

Annual Incremental Cash Inflows

	Amount
	Rs.
Savings in Labour Costs	50,000
Less : Depreciation of New Machine (2,40,000 ÷ 8)	30,000
Net Increase in Earnings before tax	20,000
Less : Tax @ 40%	8,000
New Increase in Earning after tax (EAT)	12,000
Add : Depreciation	30,000
Incremental Cash Flow After Tax (CFAT)	42,000

Calculation of Net Present Value

	Amount
	Rs.
Annuity of Rs. 42,000 will be obtained for next 8 years.	
PVAF of 8 years at 10% as per annuity table A-4 is 5.335	
Hence, PV of Incremental Inflows (42,000 × 5.335)	2,24,070
Less : PV of Outflows (calculated above)	2,16,000
NPV	8,070

As the NPV of the proposal is positive, machine may be replaced.

Q.6. Chandra Ltd. purchased a special machine one year ago at a cost of Rs. 12,000. At that time the machine was estimated to have a useful life of 6 years and no salvage value. The annual cash operating cost is approximately Rs. 20,000. A new machine has just come on the market which will do the same job but with an annual cash operating cost of only Rs. 17,000. The new machine costs Rs. 21,000 and has an extimated life of 5 years with zero salvage value. The old machine can be sold for Rs. 10,000 to a scrap dealer, straight line depreciation is used, and the company's income tax rate is 40 per cent. Assuming a cost of capital of 8%, you are required to compute the incremental cash flows after taxes.

(D.U.B. Com Hons. 2002)

SOLUTION:

Calculation of Cash Outflows:

	Amount
	Rs.
Cost of New machine	21,000
Less : Proceeds from sale of old machine	10,000
∴ Incremental cash out flow	11,000

Calculation of Annual Inflows:

	Amount	*Amount*
	Rs.	Rs.
Cash Operating Cost of Old Machine	20,000	
Less : Cash Operating Cost of New Machine	17,000	
Saving in Cash Operating Cost	3,000	3,000
Depreciation of Old Machine (12,000 ÷ 6)	2,000	
Depreciation of New Machine (21,000 ÷ 5)	4,200	
Increase in Depreciation	2,200	2,200
Net Increase in earning before tax		800
Less : Tax @ 40%		320
Net Increase in earning after tax (EAT)		480
Add : Depreciation		2,200
Incremental Cash Flow After Tax (CFAT)		2,680

Q.7. Raja Ltd. wants to replace its existing plant. It has received three mutually exclusive proposals I, II and III. The plants under the three proposals are expected to cost Rs. 2,50,000 each and have an estimated life of 5 years, 4 years and 3 years respectively. The company's required rate of return is 10%. The anticipated net cash inflows after taxes for the three plants are as follows :

Years	*Plant I*	*Plant II*	*Plant III*
	Rs.	Rs.	Rs.
1	80,000	1,10,000	1,30,000
2	60,000	90,000	1,10,000

3	60,000	85,000	20,000
4	60,000	35,000	—
5	1,80,000	—	—

Which of the above proposals would you recommend to the management for acceptance? You may use NPV technique for evaluation :

Year	*CFAT*
1	0.909
2	0.826
3	0.751
4	0.683
5	0.621

(D.U.B. Com. Hons. 2002)

SOLUTION:

Calculation of NPV

Year	*PVF at 10%*	*Plant I*		*Plant II*		*Plant III*	
		CFAT	*PV of CFAT*	*CFAT*	*PV of CFAT*	*CFAT*	*PV of CFAT*
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1	0.909	80,000	72,720	1,10,000	99,990	1,30,000	1,18,170
2	0.826	60,000	49,560	90,000	74,340	1,00,000	90,860
3	0.751	60,000	45,060	85,000	63,835	20,000	15,020
4	0.683	60,000	40,980	35,000	23,905	—	—
5	0.621	1,80,000	1,11,780	—	—	—	—
P.V. of Cash Inflow			3,20,100		2,62,070		2,24,050
Less: Cash Outflow			2,50,000		2,50,000		2,50,000
NPV			70,100		12,070		–25,950

Since Plant III is having negative NPV, it should be rejected. Out of Plants I and II, Plant I should be selected as it is having higher NPV.

Q.8. A Company is considering which of the two mutually exclusive projects it should undertake. The finance director thinks that the project with the higher NPV should be chosen whereas the managing director thinks that the one with the higher IRR should be undertaken especially as both projects have the same initial outlay and length of life. The company anticipates a cost of 10% and the net after tax cash flows of the projects are as follows :

(CASH FLOWS : Rs. '000)

Year	*Project X*	*Project Y*
0	(200)	(200)
1	35	218

2	80	10
3	90	10
4	75	4
5	20	3

Calculate NPV and IRR of each project. State with reason, which project you would recommend.

(D.U.B. Com. Hons. 2007, 2008)

SOLUTION :

(i) Calculation of NPV : *(Rs. in '000)*

Year	*Project X*	*Project Y*	*DF @ 10%*	*PV in X*	*PV in Y*
0	(200)	(200)	1	–200	–200
1	35	218	0.909	31.815	198.162
2	80	10	0.826	66.080	8.260
3	90	10	0.751	67.590	7.510
4	75	4	0.683	51.225	2.732
5	20	3	0.621	12.420	1.863
			NPV	29.13	18.527

(ii) Calculation of IRR :

Project *X* : Average Inflows: $\frac{30+80+90+75+20}{5}=60$

Fake Pay-back Period = 200 ÷ 60 = 3.333 years

PVAF of 3.333 for 5 years as per table A-4 is located at 15%

Hence, NPV may be calculated at 15% and 16%.

Project *Y* : Average Inflows $=\frac{218+10+10+4+3}{5}=49$

Fake Pay-back Period = 200 ÷ 49 = 4.082

PVAF of 4.082 for 5 years as per table A-4 is located at 7%

Since most of the Cash inflow is occurring in year 1, we have to move sufficiently upwards and NPV may be calculated at 18% and 19%.

(Rs. in '000)

Year	*Project X*					*Project Y*				
	CF	*PVF at 15%*	*PV*	*PVF at 16%*	*PV*	*CF*	*PVF at 18%*	*PV*	*PFV at 19%*	*PV*
1	35	.870	30.45	.862	30.17	218	.847	184.65	.840	183.12
2	80	.756	60.48	.743	59.44	10	.718	7.18	.706	7.06
3	90	.658	59.22	.641	57.69	10	.609	6.09	.593	5.93

4	75	.572	42.90	.552	41.40	4	.516	2.06	.499	2.00
5	20	.497	9.94	.476	9.52	3	.737	1.31	.419	1.26
			202.99		198.22			201.29		199.37
		Less: Cost	200.00		200.00			200.00		200.00
		NPV	2.99		–1.78			1.29		–0.63

IRR of Project *X* :

Interpolation between 15% and 16% :

$$\text{IRR} = 15 + \frac{2.99}{2.99 - (-1.78)} = 15.63\%$$

IRR of Project *Y* :

Interpolation between 18% and 19% :

$$\text{IRR} = 18 + \frac{1.29}{1.29 - (-0.63)} = 18.67\%$$

Q.9. Moongapa Ltd. has a machine with an additional life of 5 years which costs Rs. 10,00,000 an has a book value of Rs. 4,00,000. A new machine costing Rs. 20,00,000 is available. Though its capacity is the same as that of old machine, it will mean a saving in variable costs to the extent of Rs. 7,00,000 per annum. The life of the machine will be 5 years at the end of which it will have a scrap value of Rs. 2,00,000. The income tax is 40% and as a policy the firm does not make an investment if the yield is less than 12% per annum. The old machine if sold today, will realise Rs. 1,00,000, it will have no salvage value if sold at the end of 5 years. Advise Moongapa Ltd. whether or not the old machine should be replaced? Capital gain on sale of old machine is also subject to the same tax at the rate of 40%.

(D.U.B. Com. Hons. 2008)

SOLUTION:

	Amount	*Amount*
	Rs.	Rs.
Calculation of Cash Outflows:		
Cost of new Machine		20,00,000
Less : Sale of Old Machine	1,00,000	
+ Tax Saving 40% on (4,00,000 – 1,00,000)	1,20,000	2,20,000
Net Outflows		17,80,000
Calculattion of Cash Inflows:		
Savings in Variable Cost		7,00,000
Less: Increase in Depreciation :		
Depreciation on New Machine : 20% on (20,00,000 – 2,00,000	3,60,000	
Depreciation on Old Machine 20% on 4,00,000	80,000	2,80,000
Net Increase in Earning before Tax		4,20,000

Less : Tax @ 40%		1,68,000
Net Increase in Earning after Tax (EAT)		2,52,000
Add: Depreciation		2,80,000
Incremental Cash Flow After tax (CFAT)		5,32,000

Calculation of Net present Value :

Annuity of Rs. 5,32,000 will be obtained for next 5 years.		
PVAF of 5 years at 12% as per annuity table A-4 is 3.605		
Hence, PV of Incremental Inflows (5,32,000 × 3.605)		19.17,860
+PV of Terminal Inflow i.e., Scrap Value (2,00,000 × 0.567)*		1,13,400
		20,31,260
(–) Cash Outflows		17,80,000
	N P V	2,51,260

*0.567 is the Present Value @ 12% as per Table A-3.

Since NPV is positive, machine may be replaced.

Q. 10. Aryan Enterprises is considering the possibility of manufacturing a particular component which at present is being bought from outside. The manufacture of the component would call for an investment of Rs. 7,50,000 in a new machine besides an additional investment of Rs. 50,000 in working capital. The life of the machine would be 10 years with a salvage value of Rs. 50,000. The estimated savings (before tax) would be Rs. 1,80,000 per annum. The income tax rate is 50%. The company's required rate of return is 10%. Depreciation is provided on straight line basis. Suggest the firm whether this investment be made or not.

SOLUTION:

	Amount
	Rs.
Calculation of Cash Outlfows:	
Cost of new machine	7,50,000
Add : Additional Working Capital required	50,000
	8,00,000
Cash Inflows : (Year 1 to 10)	
Savings	1,80,000
Less : Depreciation 1/10 (Rs. 7,50,000 – Salvage Value Rs. 50,000)	70,000
Earning before tax	1,10,000
Less : Tax @ 50%	55,000
Earning after tax (EAT)	55,000
Add : Depreciation	70,000
Cash Flow After Tax (CFAT)	1,25,000
Present Value of an annuity at 10% for 10 years	

as per Table A-4 is 6.145		
PF of CFAT : Rs. 1,25,000 × 6.145		7,68,125
10th year : Salvage Value + Working Capital (50,000 + 50,000) = 1,00,000		
PV of Re 1 at 10% after 10 years as per Table A-3 is 0.386		
Hence,	PV of CFAT of Rs. 1,00,000 is (1,00,000 × .386)	38,600
	Present Value of Cash Inflows	8,06,725
	Less: Cash Outflows	8,00,000
	NPV	6,725

Investment shall be made.

Q. 11. The Rodex Company is considering investment in a machine that produces product *X*. The machine will cost Rs. 5,00,000. IN the first year 10,000 units of *X* will be produced and the price will be Rs. 20 per unit. The volume is expected to increase by 20% and price of the product by 10%. The material used to manufacture the product is becoming more expensive. The cost of production is therefore expected to increase by 15%. The production cost in the first year will be Rs. 10 per unit.

The Company uses straight-line depreciation on the machine for tax purposes. There will be no salvage value of 5-year of the machine. The tax rate is 50% and the discount rate is 20%. Should the machine be bought? *(D.U.B Com. Hons. 2009)*

SOLUTION :

	Year 1	*Year 2 to 5*
Sales (Units)	10,000	12,000
Selling Price Per Unit (Rs.)	20	22
Cost of Production Per Unit (Rs.)	10	11.5
Sales (Rs.)	2,00,000	2,64,000
Cost of production (Rs.)	1,00,000	1,38,000
Cash Flow before taxes (Rs.)	1,00,000	1,26,000
Less: Depreciation	1,00,000	1,00,000
Earning before taxes (Rs.)	0	26,000
Less: Taxes @ 50%	0	13,000
Earning after taxes	0	13,000
Cash Flow after taxes : (Earning after taxes + Depreciation)	1,00,000	1,13,000

Calculation of NPV

Year	*CFAT*	*PVF @ 20%*	*PV*
			Rs.
1	1,00,000	0.833	83,300
2	1,13,000	0.694	78,422
3	1,13,000	0.579	65,427

4	1,13,000	0.482	54,466
5	1,13,000	0.402	45,426
		PV of Cash Inflows	3,27,041
		Less: Initial Investment	5,00,000
		NPV (–)	1,72,959

Machine should not be purchased because of negative NPV.

Q. 12. A company requires an initial investment of Rs. 75,000. The estimted net cash flows are as follows :

Year	*Net Cash Flow*
	Rs.
1	8,000
2	8,000
3	8,000
4	8,000
5	11,000
6	16,000
7	20,000
8	18,000
9	15,000
10	10,000

Using 10% as the cost of capital (rate of discount), determine :

(a) Pay-back Period;

(b) Net Present Value.

PVF @ 10% for 10 years are :

0.909, 0.826, 0.751, 0.683, 0.621, 0.564, 0.513, 0.467, 0.424 and 0.386.

(D.U.B. Com. 2009 Regular)

SOLUTION:

Table Showing Cash Flow of Project

Year	*Net Cash Flow*	*Cumulative Cash Flow*
	Rs.	Rs.
1	8,000	8,000
2	8,000	16,000
3	8,000	24,000
4	8,000	32,000
5	11,000	43,000
6	16,000	59,000

7	20,000	79,000
8	18,000	97,000
9	15,000	1,12,000
10	10,000	1,22,000

$$\text{Pay-back period} = E + \frac{B}{C} = 6 \text{ years} + \frac{75,000 - 59,000}{20,000} = 6.8 \text{ years}$$

where, E stands for number of years immediately preceding the year of final recovery.

B stands for the balance amount still to be recovered.

C stands for cash flow during the year of final recovery.

(b) Net Present Value Method :

Calculation of Present Value of Cash Inflows

Year	*Net Cash Flow*	*Discount factor*	*Present Value*
	Rs.		Rs.
1	8,000	0.909	7,272
2	8,000	0.826	6,608
3	8,000	0.751	6,008
4	8,000	0.683	5,464
5	11,000	0.621	6,831
6	16,000	0.564	9,024
7	20,000	0.513	10,260
8	18,000	0.467	8,406
9	15,000	0.424	6,360
10	10,000	0.386	3,860
			70,093

Net Present Value = Total Present Value – Initial Outlay

= Rs. 70,093 – Rs. 75,000

= – Rs. 4,907

Q. 13. A firm is considering to purchase a new machine which will cost Rs. 1,20,000. The cost of installation will amount to Rs. 25,000. The increase in working capital requirements will be Rs. 15,000. The machine is expected to provide cash inflows before depreciation and taxes of Rs. 70,000 for a period of five years after which it can be sold for Rs. 50,000. The firm applies straight line method of depreciation. The tax rate on income is 35%. Calculate all the cash flows associated with the machine.

(D.U.B. Com. 2009, External)

SOLUTION:

	Amount
	Rs.
I. Calculation of Initial Investment or Cash Outlfows:	
Cost of New Machine	1,20,000
Add : Installation costs	25,000
Add : Increase in working capital requirements	15,000
Initial Investment	1,60,000
II. Calculation of Net Annual Cash Inflows :	
Cash inflows before depreciation and taxes	70,000
Less : Depreciation 1/5 of (1,20,000 + 25,000 – 50,000)	19,000
Net Increase in Earnings before tax	51,000
Less : Tax @ 35%	17,850
Net Increase in Earnings after tax	33,150
Add : Depreciation	19,000
Incremental Cash Flow after tax (CFAT)	52,150
III. Calculation of terminal Cash Inflows	
Salvage value of the machine	50,000
Working Capital released	15,000
Terminal Cash Inflows (at the end of the 5th year)	65,000
IV. Cash Inflows in 5th year	
Net Annual Cash inflows (II)	52,150
Add : Terminal Cash inflows (III)	65,000
	1,17,150

Q. 14 Rama Ltd. is considering two mutually exclusive machines to meet the rapidly rising demand for its product. The cash flows after taxes under the two alternative are as follows :

(Rs. in lacs)

Year	0	1-5 year
Machine A	–25	10
Machine B	–40	14

The company's cost of capital is 10%. Compute net present value and profitability index for both the machines and advise the company which machine should be bought. Specify the reason also for your advice.

PVAF factor for 5 years at 10% is 3.791. *(D.U.B. Com. 2009, External)*

SOLUTION: Calculation of Net Present Value:

	Machine A	*Machine B*
Annual Cash inflows	Rs. 10,00,000	Rs.14,00,000
Period	5 years	5 years
PVAF (10% 5 year)	3.791	3.791
Present Value	10,00,000 × 3.791	14,00,000 × 3.791
	= Rs. 37,91,000	= Rs. 53,07,400
Less : Cost (Outflow)	= Rs. 25,00,000	= Rs. 40,00,000
NPV	12,91,000	13,07,400

Profitability Index:

$$PI = \frac{\text{PV or Inflows}}{\text{PV of Outflows}}$$

Machine A = Rs. 37,91,000 ÷ Rs. 25,00,000 = 1.516

Machine B = Rs. 53,07,400 ÷ Rs. 40,00,000 = 1.326

Machine B has a better ranking based on NPV while Machine A has a better ranking based on PI. Thus, there is a conflict between NPV and PI methods. In such a case, Machine A, should be preferred because it will contribute more per ruppee invested.

PROBLEMS AND SOLUTIONS OF EXAMINATIONS QUESTIONS

DELHI UNIVERSITY EXAMINATION QUESTIONS

Q.1. ABC Ltd. has its equity shares quoted on the stock exchange for Rs. 80 per share. A constant annual growth rate of 5% is expected and the company has paid dividend of Rs. 20 per share last year. You are required to compute the cost of equity. *(D.U.B.Com. Hons. 2002)*

SOLUTION :

$$K_e = \frac{D_1}{P_0} \times 100 + G$$

D_1 = Expected Dividend

P_0 = Current Market Price

G = Growth Rate

D_1 = Rs. 20 (1 + 5%) = Rs. 21

$$K_e = \frac{21}{80} \times 100 + 5\% = 31.25\%$$

Q. 2. Equity shares of P Ltd. is currently priced at Rs. 60. Dividend expected at the end of one year from now is Rs. 6. Cost of equity for companies of similar risk is 18%. What is the expected growth rate?

What is expected to happen if due to some adverse development in the capital market, the growth rate projection is revised down to 5%. *(D.U.B.Com. Hons. 2006)*

SOLUTION :

$$K_e = \frac{D_1}{P_0} \times 100 + G$$

$$18\% = \frac{6}{60} \times 100 + G$$

$$G = 18\% - 10\% = 8\%$$

If the growth rate is revised to 5%:

Expected dividend after 1 year is Rs. 6 which is based on the growth rate of 8%. Hence, the present dividend is 6 ÷ (1 + .08) = Rs. 5.555. On the basis of new growth rate of 5%, the expected dividend after 1 year will be Rs. 5.555 × 1.05 = Rs. 5.833.

$$MP = \frac{D_1}{K_e - G}$$

$$= \frac{\text{Rs. } 5.833}{18\% - 5\%} = \text{Rs. } 44.87$$

Q. 3. Equity share of A Ltd. is currently selling in the market at Rs. 100. Dividends paid in the last 5 years are Rs. 4.00, Rs. 4.25, Rs. 4.60, Rs. 4.85 and Rs. 5.05. The company wants to issue new equity shares and has been advised to price them at Rs. 90. Floatation costs are likely to be Rs. 8 per share. Calculate the growth rate, cost of existing and new equity for the company.

(D.U.B.Com. Hons. 2006)

SOLUTION :

Growth rate : Increase in Dividends over four years $= \frac{5.05}{4} = 1.2625$

CFV table (Table A-1) for 4 years shows that rate of interest implied is 6%. Hence, growth of the firm is 6%.

Expected current Dividend Per Share (*DPS*) = Rs. 5.05 (1 + 0.06) = Rs. 5.353

$$K_e \text{ for existing equity capital} = \frac{D_1}{P_0} \times 100 + G$$

$$= \frac{5.353}{100} \times 100 + 6\%$$

$$= 5.353 + 6\% = 11.353\%$$

$$K_e \text{ for new equity capital} = \frac{D_1}{NP} \times 100 + G$$

$$= \frac{5.353}{90 - 8} \times 100 + 6\%$$

$$= 12.53\%$$

Q.4. The following is the capital structure of *ABC* Ltd.

Equity share Capital (F.V. Rs. 10 each)	Rs. 5,00,000
12% Preference Share Capital (F.V. Rs. 100)	Rs. 4,00,000
8% Debentures (Face Value Rs. 100)	Rs. 6,00,000
	Rs. 15,00,000

Equity shares are currently selling at Rs. 15 each. The company paid a dividend of Rs. 2 per share for the last year. The dividends are expected to increase at 5% p.a. The preference shares and debentures are being traded at 90% and 80%. Tax rate applicable to company is 40%. Find out the Weighted Average cost of capital of the firm using :

(*i*) Book value weights, and

(*ii*) Market value weights. *(D.U.B.Com. Hons. 2008)*

SOLUTION :

(*i*) Cost of Equity Share Capital :

$$K_e = \frac{D_1}{NP} \times 100 + 5\% = 19\%$$

Expected *DPS* = Company paid a dividend of Rs. 2 per share for the last year and dividends are expected to increase at 5%.

Hence, Expected DPS = Rs. 2 + 5% = Rs. 2.10

$$= \frac{2.10}{15} \times 100 + 5\% = 19\%$$

(*ii*) Cost of Pref. Share Capital :

$$K_p = \frac{D}{NP} \times 100 = 13.33\%$$

$$= \frac{12}{90} \times 100 = 13.33\%$$

(*iii*) Cost of Debentures :

$$K_{da} = \frac{1}{NP} \times 100\,(1-t)$$

$$= \frac{8}{80} \times 100(1-0.40) = 10\% \times 0.60 = 6\%$$

Weighted Average Cost of Capital using Book Value Weights

Source	*Book Value*	*Weight*	*Cost%*	*Weighted Cost*
	Rs.			
Equity Share Capital	5,00,000	.333	19	6.327
Pref. Share Capital	4,00,000	.267	13.33	3.559
Debentures	6,00,000	.4	6	2.4
	15,00,000			12.286
				or 12.29%

Weighted Average Cost of Capital using Market Value Weights

Source	*Market Value*	*Weight*	*Cost %*	*Weighted Cost*
	Rs.			
Equity Share Capital	7,50,000	.4717	19	8.9623
Pref. Share Capital	3,60,000	.2264	13.33	3.0179
Debentures	4,80,000	.3019	6	1.8114
	15,90,000			13.7916
				or 13.79%

Q. 5. The shares of a chemical co. are selling at Rs. 20 per share. The firm had dividend at Rs. 2 per share last year. The estimated growth of the dividends from the company is 5% p.a., the required rate of return of the equity investors is 15.5%.

Determine the estimated market price of the equity share if the estimated growth rate of dividents :

(1) turn out to be as estimated

(2) rises to 8%

(3) falls to 3%

What would be the values of the equity share in all the three above situations if the required rate of return is 12%? *(D.U.B.Com. Hons. 2008)*

SOLUTION :

Calculation of Market Price :

$$MP = \frac{D_1}{K_e - G}$$

D_1 : If growth rate is 5% = Rs. 2 + 5% = Rs. 2.10

If growth rate is 8% = Rs. 2 + 8% = Rs. 2.16

If growth rate is 3% = Rs. 2 + 3% = Rs. 2.06

Calculation of Market Price :

Growth rates

	5%	*8%*	*3%*
If K_e = 15.5%	$\frac{2.10}{15.5\% - 5\%}$ = Rs. 20	$\frac{2.16}{15.5\% - 8\%}$ = Rs.28.80	$\frac{2.06}{15.5\% - 3\%}$ = Rs.16.48
If K_e = 12%	$\frac{2.10}{12\% - 5\%}$ = Rs. 30	$\frac{2.16}{12\% - 8\%}$ = Rs. 54	$\frac{2.06}{12\% - 3\%}$ = Rs. 22.89

Q. 6. The capital structure of Falcon Company Ltd. as on 31-12-2007 is as follows :

	Rs.
Equity share capital of : 10,000 shares of Rs. 100 each	10,00,000
10% Preference Shares of Rs. 100 each	4,00,000
12% Debentures	6,00,000
	20,00,000

The market price of the company's share is Rs. 110 and it is expected that a divident of Rs. 10 per share would be declared after one year. The dividend growth rate is 6%.

(*i*) If the company is in the 40% tax bracket, calculate weighted average cost of capital.

(*ii*) The company needs to borrow a fund of Rs. 10 lacs for its expansion plan, the rate of interest is 14%, what will be the company's revised weighted average cost of capital? This financing decision is expected to increase dividend from Rs. 10 to Rs. 12 per share. However, the market price of equity share is expected to decline from Rs.110 to Rs. 105 per share.

(D.U.B.Com. Hons. 2009)

SOLUTION :

(*a*) (*i*) Cost of Equity Share Capital :

$$K_e = \frac{D_1}{P_0} \times 100 + G$$

$$= \frac{10}{110} \times 100 + 6\% = 15.09\%$$

(*ii*) Cost of Preference Share Capital :

$$K_p = \frac{D}{NP} \times 100$$

$$= \frac{10}{100} \times 100 = 10\%$$

(*iii*) Cost of Debentures

$$K_{da} = \frac{1}{NP} \times 100\,(1-t)$$

$$= \frac{12}{100} \times 100(1-0.40) = 12\% \times 0.60 = 7.2\%$$

Weighted Average Cost : Existing Capital Structure

Source	*Amount*	*Weight*	*Cost%*	*Weighted Cost*
	Rs.			
Equity Share Capital	10,00,000	.5	15.09	7.545
Pref. Share Capital	4,00,000	.2	10	2
Debentures	6,00,000	.3	7.2	2.16
	20,00,000	1.0		11.705%

(*i*) **Cost of Equity Capital :**

$$K_e = \frac{D_1}{P_0} \times 100 + G$$

$$= \frac{12}{105} \times 100 + 6\% = 17.43\%$$

(*ii*) Cost of Pref. Share Capital = 10%

(*iii*) Cost of Existing 12% Debentures = 7.2% (Calculated as above)

Cost of 14% Long Term Loan :

$$K_{da} = \frac{1}{NP} \times 100\,(1-t)$$

$$= \frac{14}{100} \times 100\,(1-0.40)$$

$$= 14\% \times 0.60 = 8.4\%$$

Weighted Average Cost : New Capital Structure (using market value weights)

Source	*Market Value*	*Weight*	*Cost%*	*Weighted Cost*
	Rs.			
Equity Share Capital (10,000 Shares × Rs. 105)	10,50,000	.344	17.43	5.99592
Preference Share Capital	4,00,000	.131	10	1.31000
12% Debentures	6,00,000	.197	7.2	1.41840
14% Long Term Loan	10,00,000	.328	8.4	2.75520
	30,50,000	1.0		11.47952 or 11.48%

Q. 7. Keenam Ltd. is planning to raise Rs. 1 crore by the issue of 12% preference shares of Rs. 100 each at 10% discount. The underwriting expenses are expected to be 2%. Find out the cost of preference share capital in each of the following cases :

(*i*) If preference shares are irredeemable.

(*ii*) If preference shares are redeemable at the end of 10th year at 15% premium. Use shortcut method. *(D.U.B.Com. 2009 External)*

SOLUTION :

(*i*) Cost of Equity Share Capital :

$$K_p = \frac{D}{NP} \times 100$$

D = 12% of 1 Crore = Rs. 12,00,000

NP = Net Proceeds

= Rs. 1 Crore – (10 + 2)% of Rs. 1 Crore

= Rs. 88,00,000

$$K_p = \frac{12,00,000}{88,00,000} \times 100 = 13.64\%$$

(*ii*) If Preference Shares are Redeemable:

$$K_{pr} = \frac{D + \frac{1}{n}(RV - NP)}{\frac{1}{2}(RV + NP)} \times 100$$

n = 10 Years

RV = Redemption Value of Preference Shares

= 1 Crore + 15% or 1 Crore

= 1,15,00,000

$$K_{pr} = \frac{12,00,000 + \frac{1}{10}(1,15,00,000 - 88,00,000)}{\frac{1}{2}(1,15,00,000 + 88,00,000)} \times 100$$

$$= \frac{14,70,000}{1,01,50,000} \times 100$$

= 14.48%

ILLUSTRATION 1

The following information is available in respect of two firms, *P* Ltd. and *Q* Ltd. :

(Figures in Rs. Lacs)

	P Ltd.	*Q Ltd.*
Sales	500	1,000
Variable Cost	200	300
Contribution	300	700
Fixed Cost	150	400
EBIT	150	300
Interest	50	100
Profit before Tax	100	200

You are required to :

(*i*) Calculate different leverages for both the firms, and

(*ii*) Comment on the relative risk position of them.

(B.Com.Hons. Delhi University, 1999)

SOLUTION :

Calculation of Leverages :

	P Ltd.	*Q Ltd.*
(*a*) Operating Leverage : $\frac{\text{Contribution}}{\text{Earning before interest and tax (EBIT)}}$	$\frac{300}{150} = 2$	$\frac{700}{300} = 2.33$
(*b*) Financial Leverage : $\frac{\text{Earning before interest and tax (EBIT)}}{\text{Earning before tax (EBT)}}$	$\frac{150}{100} = 1.5$	$\frac{300}{200} = 1.5$
(*c*) Combined Leverage : $\frac{\text{Contribution}}{\text{EBT}}$	$\frac{300}{100} = 3$	$\frac{700}{200} = 3.5$
OR	OR	OR
Operating Leverage × Financial Leverage	2 × 1.5 = 3	2.33 × 1.5 = 3.5

Comment :

(*i*) **Operating Leverage :** As operating leverage for Q Ltd. is higher, it is therefore subject to higher degree of business risk than *P* Ltd. The tendency of operating profit to vary with sales is higher in *Q* Ltd.

(*ii*) **Financial Leverage :** The financial leverage of both the companies is 1.5 times. It means that interest burden is proportionately same, and also financial risk is same for both the companies.

(*iii*) **Combined Leverage :** Combined leverage of *Q* Ltd. is higher and as such its overall risk is more than that of *P* Ltd.

Q. 3. Given below are the data of two cmpanies :

	R. Ltd.	*S.Ltd.*
Sales (Rs.)	40,00,000	35,00,000
Variable Cost	30% of Sales	30% of Sales
Fixed Cost (Rs.)	2,50,000	3,00,000
Interest (Rs.)	14,00,000	1,50,000

Calculate degree of Operating Leverage and degree of Financial Leverage.

SOLUTION : Calculation of Operating Leverage and Financial Leverage

	R. Ltd.	*S.Ltd.*
	Rs.	Rs.
Sales	40,00,000	35,00,000
Less : Variable cost (30% of Sales)	12,00,000	10,50,000
Contribution (C)	28,00,000	24,50,000

Less : Fixed Cost	2,50,000	3,00,000
EBIT	25,50,000	21,50,000
Degree of Operating Leverage		
$(DOL) = \frac{C}{EBIT}$	$\frac{28,00,000}{25,50,000} = 1.09$	$\frac{24,50,000}{21,50,000} = 1.14$
Interest	14,00,000	1,50,000
EBT (EBIT – Interest)	11,50,000	20,00,000
Degree of Financial Leverage		
$(DFL) = \frac{EBIT}{EBT}$	$= \frac{25,50,000}{11,50,000} = 2.21$	$= \frac{21,50,000}{20,00,000} = 1.07$

Q. 3. (*a*) A firm has sales of Rs. 20,00,000, variable costs of Rs. 14,00,000 and fixed costs of Rs. 3,00,000 inclusive of interest of Rs. 1,00,000 :

(*i*) Calculate its operating, financial and combined leverages.

(*ii*) If the firm decides to double its EPS, how much of a rise in sales would be needed on a percentage basis.

SOLUTION :

(*i*) Degree of Operating Leverage $= \frac{\text{Contribution}}{\text{EBIT}}$

$= \frac{6,00,000}{4,00,000} = 1.5$ times

Degree of Financial Leverage $= \frac{\text{EBIT}}{\text{EBT}}$

$= \frac{4,00,000}{3,00,000} = 1.33$ times

Degree of Combined Leverage $= \frac{\text{Contribution}}{\text{EBT}}$

$= \frac{6,00,000}{3,00,000} = 2$ times

(*ii*) Degree of combined leverage measures the effect of Sales on EPS.

In the above case combined leverage is 2 times.

Therefore, to double is EPS, the firm has to increase its sales by 50%.

ILLUSTRATION 2

Two firms U and L are identical in every respect, except that U is unlevered and L is levered. L has Rs. 20 lakh of 8% debt outstanding. The net operating income of both firms is identical, *i.e.,* Rs. 6 Lakh. The corporate tax rate is 35% and equity capitalisation rate for U is 10%. Find out the value of each firm according to the MM Approach and cost of equity for L Ltd.

SOLUTION :

Calculation of Value of the two Companies :

	U	L
	Rs.	Rs.
EBIT	6,00,000	6,00,000
Less : Interest (8% on 20 Lakh)	—	1,60,000
Earning before Tax (EBT)	6,00,000	4,40,000
Less : Tax @ 35%	2,10,000	1,54,000
Earnings available to equity shareholders on Net Income (NI)	3,90,000	2,86,000
Equity Capitalisation Rate (K_e)	10%	11%*
Market Value of Equity (S) = $\frac{NI}{K_e}$	39,00,000	26,00,000
Market Value of Debt (B)	—	20,00,000
Market Value of the Firm (V) = S + B	39,00,000	46,00,000

* Equity capitalisation Rate of 11% is calculated as follows :

Value of levered Firm L:

$V_L = V_u + D_t$

Where, V_L = Value of Levered Firm

V_u = Value of Unlevered Firm

D = Debt

t = tax rate

= 39,00,000 + 20,00,000 (0.35)

= 39,00,000 + 7,00,000 (Note 1) = 46,00,000

Value of equity (S) of Levered Firm $L = V_L$ – Debt = 46,00,000 – 20,00,000 = 26,00,000

Cost of Equity or Equity Capitalisation Rate (K_e) = $\frac{NI}{S} = \frac{2,86,000}{26,00,000} = 11\%$

Note 1. This figure of Rs. 7,00,000 is the value of tax shield. It can also be calculated as follows :

$$\text{Amount of Interest} \times \frac{100}{\text{Rate of Interest}}(0.35)$$

$$= 1,60,000 \times \frac{100}{8}(0.35) = 20,00,000\,(0.35) = \text{Rs. } 7,00,000$$

DELHI UNIVERSITY EXAMINATION QUESTIONS

Q.1. *S* Ltd. and *T* Ltd. are in the same risk class and are identical in all respects except that company S uses debt while company *T* does not use debt. The levered firm has Rs. 9,00,000 debentures carrying 10% rate of interest. Both the firms earn 20% operating profit on their total assets of Rs. 15 lakhs. The company is in the tax bracket of 35% and capitalisation rate of 15% on all equity shares.

You are required to compute value *S* Ltd. and *T* Ltd. using Net Income approach.

SOLUTION :

Values of *S* Ltd. and *T* Ltd. (Net Income Approach) :

	S Ltd.	*T Ltd.*
	Rs.	Rs.
EBIT (20% of Rs. 15 Lakhs)	3,00,000	3,00,000
Less : Interest	90,000	—
EBT	2,10,000	3,00,000
Less : Tax @ 35%	73,500	1,05,000
Earnings available to equity shareholders or Net Income (NI)	1,36,500	1,95,000
Equity Capitalisation Rate (K_e)	15%	15%
Market Value of Equity (S) = $\frac{NI}{K_e}$	9,10,000	13,00,000
Market Value of Debt (B)	9,00,000	—
Market Value of the Firm (V) = $S + B$	18,10,000	13,00,000

Q. 2. Two firms *X* and *Y* are identical in all respects including risk factors except for debt/equity. *X* has issued 10% debentures of Rs. 18 lakhs while *Y* has issued only equity. Both the firms earn 20% before interest and taxes on their total assets of Rs. 30 lakhs.

Assuming a tax rate of 50% and capitalisation rate of 15% for an all equity firm, compute the value of companies *X* and *Y* using Net Income Approach.

(D.U.B.Com. Hons. 2003)

SOLUTION :

Values of *X* Ltd. and *Y* Ltd. : (Net Income Approach)

	X Ltd.	*Y Ltd.*
	Rs.	Rs.
EBIT (20% or Rs. 30 Lakhs)	6,00,000	6,00,000
Less : Interest	1,80,000	—
EBT	4,20,000	6,00,000
Less : Tax @ 50%	2,10,000	3,00,000
Earnings available to equity shareholders or Net Income (NI)	2,10,000	3,00,000

Equity Capitalisation Rate (K_e)	15%	15%
Market Value of Equity (S) = $\frac{NI}{K_e}$	14,00,000	20,00,000
Market Value of Debt (B)	18,00,000	—
Market Value of the Firm (V) = $S + B$	32,00,000	20,00,000

Q. 3. *ABC* Ltd. has all equity capital structure with a cost of capital of 15%. The company decides to raise Rs. 2,00,000, 12% debt and use the proceeds to retire the equity. The expected level of EBIT is Rs. 90,000 which is expected to remain unchanged. Assuming net income approach assumptions are applicable, calculate value of equity, debt and the value of firm before and after change in capital structure. Also calculate weighted average cost of capital after the change.*(D.U.B.Com. Hons. 2005)*

SOLUTION :

Values as per Net Income Approach :

	X Ltd.	*Y Ltd.*
	Rs.	Rs.
EBIT	90,000	90,000
Less : Interest (12% on Rs. 2,00,000)	—	24,000
Earnings available to equity shareholders or Net Income (NI)	90,000	66,000
Equity Capitalisation Rate (K_e)	15%	15%
Market Value of Equity (S) = $\frac{NI}{K_e}$	6,00,000	4,40,000
Market Value of Debt (B)	—	2,00.000
Market Value of the Firm (V) = $S + B$	6,00,000	6,40,000
Weighted Average Cost of Capital (WACC) = EBIT ÷ V	15%	14.0625%

Q. 4. From the following selected data determine the average cost of capital and value of Vardhaman Ltd. as net operating income approach :

Net operating income	Rs. 25,00,000
Interest on debentures	Rs. 10,00,000
Cost of equity	0.15
Cost of debt	0.10

The company further raises Rs. 50,00,000 from debt carrying 10% interest and uses this money to repurchase its equity and hence increases debt-equity ratio. What happens to value of the firm assuming net operating income approach applied and there are no taxes? Why?

(D.U.B.Com. 2009, External)

SOLUTION :

	Rs.
Net Operating Income (EBIT)	= 25,00,000
Less : Interest on Debentures	= 10,00,000

$$\text{EBT} = 15,00,000$$

$$\text{Cost of Equity } (K_e) = \frac{\text{EBT}}{\text{Value of Equity}}$$

$$0.15 = \frac{15,00,000}{\text{Value of Equity}}$$

$$\text{Value of equity} = \frac{15,00,000}{0.15} = \text{Rs. } 1,00,00,000$$

$$\text{Market Value of Debt} = \frac{\text{Interest}}{\text{Cost of Debt } (K_d)}$$

$$= \frac{\text{Rs. } 10,00,000}{0.10} = \text{Rs. } 1,00,00,000$$

Computation of Average Cost of Capital

Component	*Proportion*	*Individual Cost*	*Multiplication*
Debt	$\frac{1,00,00,000}{2,00,00,00} = 0.5$	10%	$0.5 \times 10\% = 5\%$
Equity Capital	$\frac{1,00,00,000}{2,00,00,00} = 0.5$	15%	$0.5 \times 15\% = 7.5\%$
Total			$K_0 = 12.5\%$

$$\text{Value of firm (V)} = \frac{\text{EBIT}}{K_0} = \frac{25,00,000}{12.5\%} = \text{Rs. } 2,00,00,000$$

If company furter raises Rs. 50,00,000 from debt carrying 10% interest and uses this money to repurchase its equity, then

		Rs.
	EBIT	25,00,000
Less :	Interest on Debt (Rs. 10,00,000 + 10% of 50,00,000)	15,00,000
	EBT	10,00,000

$$K_e = \frac{\text{EBT}}{\text{Value of Equity}}$$

$$= \frac{10,00,000}{(1,00,000 - 50,00,000)} = 20\%$$

$$\text{Market Value of debt} = \frac{\text{Interest}}{\text{Cost of Debt } (K_d)}$$

$$= \frac{15,00,000}{0.10} = \text{Rs. } 1,50,00,000$$

Computation of New Average Cost of Capital

Component	*Proportion*	*Individual Cost*	*Multiplication*
Debt	$\frac{1,50,00,000}{2,00,00,00} = 0.75$	10%	$0.75 \times 10\% = 7.5\%$
Equity Capital	$\frac{50,00,000}{2,00,00,00} = 0.25$	20%	$0.25 \times 20\% = 5\%$
Total			$K_0 = 12.5\%$

$$\text{Value of firm } (V) = \frac{\text{EBIT}}{K_0} = \frac{25,00,000}{12.5\%} = \text{Rs. } 2,00,00,000$$

Thus the value of the firm has not changed, as K_d remains constant at the various levels of debt equity mix. However, as debt content increases, the expectations of equity shareholders also increase due to higher financial risk. Hence K_e increases as debt percentage increases.

Thus, the advantage of using low-cost debt is set off exactly by increase in K_e and hence K_0 remains constant.

PROBLEMS AND SOLUTIONS OF EXAMINATIONS QUESTIONS

DELHI UNIVERSITY EXAMINATION QUESTIONS

Q. 1. A firm's earning per share is Rs. 8. Its cost of equity is 15%. Its rate of return on investment is 10%. What will be market price of the firm's share as per Walter Model if dividend payout ration is (*i*) 25%, (*ii*) 50% or (*iii*) 100%? What conclusion will you draw from these prices?

SOLUTION :

Walter's formula to arrive at the appropriate dividend decision :

$$P = \frac{D + \frac{r}{K_e}(E - D)}{K_e}$$

where, P = The prevailing market price of a share

D = Dividend per share

E = Earnings per share = Rs. 8

r = The rate of return on the firm's investment = 10%.

K_e = Cost of Equity Capital or Capitalisation Rate = 15%.

(*i*) When Dividend Payout ratio is 25%

Dividend Per Share = 25% or Rs. 8 = Rs. 2

$$P = \frac{2 + \frac{0.10}{0.15}(8 - 2)}{0.15}$$

= Rs.40

(*ii*) When Dividend Payout ratio is 50%.

Dividend Per Share = 50% or Rs. 8 = Rs. 4

$$P = \frac{4 + \frac{0.10}{0.15}(8 - 4)}{0.15}$$

= Rs. 44.44

(*iii*) When Dividend Payout ration is 100%

Dividend Per Share = 100% of Rs. 8 = Rs. 8

$$P = \frac{8 + \frac{0.10}{0.15}(8 - 8)}{0.15}$$

= Rs. 53.33

Q. 2. The earning per share of a company are Rs. 10. It has rate of return or 15% and the capitalisation rate of risk class is 12.5%. If Walter's model is used :

(*i*) What should be the optimum dividend payout ratio of the firm?

(*ii*) What would be the price of the share at this payout ratio?

(*iii*) How shall the price of the share be affected if a different payout ratio was employed?

(D.U.B.Com. Hons. 2004; 2005)

SOLUTION :

Walter's Formula :

$$P = \frac{D + \frac{r}{K_e}(E - D)}{K_e}$$

where, D = Dividend per share

Dividend Payout at 0% = Zero

r = 15%

K_e = 12.5%

E = Earnings per share is Rs. 10

Price of the Share at 0% Payout Ratio :

$$P = \frac{0 + \frac{0.15}{0.125}(10 - 0)}{0.125}$$

$$= \frac{12}{0.125} = \text{Rs. } 96$$

Since $r > K_e$ no dividend should be declared. If any other payout ratio, say 40% is adopted, the market price of the share will be less than Rs. 96 under Walter's model :

D = 40% or Rs. 10 = Rs. 4

$$P = \frac{4 + \frac{0.15}{0.125}(10 - 4)}{0.125} = \frac{4 + 7.2}{0.125}$$

= Rs. 89.60 which is less than Rs. 96

Q. 3. Rahu & Co. earns Rs. 6 per share having capitalisation rate of 10% and has a return on investment of 20%. According to Walter's method what should be the price per share at 30% dividend payout ratio ? *(B.Com. D.U. Hons. 2009)*

SOLUTION :

As per Walter's Model :

$$P = \frac{D + \frac{r}{K_e}(E - D)}{K_e}$$

where, P = The prevailing market price of a share

D = Dividend per share = 30% of Rs. 6 = Rs. 1.80

E = Earnings per share

r = The rate of return on the firm's investment

K_e = Cost of Equity Capital or Capitalisation Rate

As per above formula :

$$P = \frac{1.80 + \frac{0.20}{0.10}(6 - 1.80)}{10} = \frac{10.2}{0.10} = \text{Rs. } 102$$

Q. 4. Determine the market value of equity shares of the company from the following information as per Walter's model:

Earnings of the company	Rs. 5,00,000
Dividend paid	Rs. 3,00,000
Number of shares outstanding	1,00,000
Price earning ratio	8
Rate of return on investment	15%

Are you satisfied with the current dividend policy of the firm? If not, what should be the optimal dividend payout ratio? *(B.Com. D.U. Hons. 2008)*

SOLUTION :

$$P = \frac{D + \frac{r}{K_e}(E - D)}{K_e}$$

where, $D = \frac{\text{Rs. } 3,00,000}{1,00,000} = \text{Rs. } 3 \text{ per share}$

$E = \frac{\text{Rs. } 5,00,000}{1,00,000} = \text{Rs. } 5 \text{ per share}$

$K_e = \frac{1}{8}$ or 12.5%

$$P = \frac{3+\frac{0.15}{0.125}(5-3)}{0.125} = \frac{3+2.4}{0.125}$$

= Rs. 43.20

Since $r > K_e$ no dividend should be declared.

In such a case, market price of the share will be :

$$P = \frac{0+\frac{0.15}{0.125}(5-0)}{0.125} = \frac{6}{0.125} = \text{Rs. } 48$$

Q. 5. Use Walter's Model to determine the value of the firm in the following cases :

(*a*) 100% retention;

(*b*) 50% retention;

(*c*) No retention

Cost of capital 10%

Rate of return on investiment 15%

Earnign per share Rs. 5

The firm has 10 lakh equity shares or Rs. 10 each. *(B.Com. D.U. 2009, Regular)*

SOLUTION :

Walter's formula to arrive at the appopriate dividend decision :

$$P = \frac{D+\frac{r}{K_e}(E-D)}{K_e}$$

where, P = The prevailing market price of a share

D = Dividend per share

E = Earnings per share

r = The rate of return on the firm's investment = 15%

K_e = Cost of Equity Capital or Capitalisation Rate = 10%

(*a*) 100% retention *i.e.,* when divident payout ratio is 0%

Dividend Per Share = 0

$$P = \frac{0+\frac{0.15}{0.10}(5-0)}{0.10} = \frac{0+7.5}{0.10} = \text{Rs. } 75$$

Value of Firm = Price Per Share × Number of Shares

= Rs. 75 × 10,00,000 = Rs. 7,50,00,000

(*b*) 50% retention *i.e.,* when dividend payout ratio is 50%

Dividend Per Share = 50% or Rs. 5 = Rs. 2.50

$$P = \frac{2.5 + \frac{0.15}{0.10}(5 - 2.5)}{0.10} = \frac{2.5 + 3.75}{0.10} = \text{Rs. } 62.50$$

Value of Firm = Rs. 62.50 × 10,00,000 = Rs. 6,25,00,000

(*c*) No retention *i.e.,* when dividend payout ratio is 100%

Dividend Per Share = 100% or Rs. 5 = Rs. 5

$$P = \frac{5 + \frac{0.15}{0.10}(5 - 5)}{0.10} = \frac{5 + 0}{0.10} = \text{Rs. } 50$$

Value of Firm = Rs. 50 × 10,00,000 = 5,00,00,000

Q. 6. Ghajini Ltd. currently has 10 lakh equity shares outstanding. Current market price per share is Rs. 100. The net income for the current year is Rs. 3 crore and investment budget is Rs. 4 crore. Cost of equity is 10%. The company if contemplating declaration of dividends @ Rs. 5 per share. Assuming MM approach :

(*i*) Calculate market price per share if dividend is declared and if it is not declared.

(*ii*) How many equity shares are to be issued under both the options ?

(B.Com. D.U. 2009, External)

SOLUTION :

Market Price as per MM approach is :

$$P_o = \frac{1}{1 + K_e}(D_1 + P_1)$$

where, P_o = Existing market price of a share = Rs. 100

K_e = Cost of Equity Capital = 10%

D_1 = Dividend to be received at the end of year 1 = Rs. 5

P_1 = Market Price or Shares at the end of year 1

(*a*) (*i*) Market Price when dividend is declared :

$$\text{Rs. } 100 = \frac{1}{(1 + 0.10)}(\text{Rs. } 5 + P_1)$$

or $$\text{Rs. } 100 = \frac{1}{(1.10)}(\text{Rs. } 5 + P_1)$$

or $\text{Rs. } 100 \times 1.10 = \text{Rs. } 5 + P_1$

or $\text{Rs. } 110 = \text{Rs. } 5 + P_1$

or $P_1 = \text{Rs. } 105$

(*ii*) Funds to be raised from new issue of shares :

$$\Delta nP_1 = I - (E - nD_1)$$

Where, ΔnP_1 = Amount to be raised from issue of new shares

I = Total required for investment

E = Earning of the firm during the year

nP_1 = Total dividends to be paid

After putting the values, we can have :

$$\Delta nP_1 = \text{Rs. 4 Crore} - (\text{Rs. 3 Crore} - \text{Rs. 50 Lakh})$$

$$= 1.5 \text{ Crore}$$

No of additional shares to be issued :

$$\Delta n = \frac{\text{Rs. 1.5 Crore}}{\text{Rs. 105 per share}} = 1{,}42{,}857 \text{ Shares Approx.}$$

(n represents number of shares and Δn represents number or additional shares issued)

(*b*) (*i*) Market Price when dividend is not declated :

$$P_o = \frac{1}{1+K_e}(D_1 + P_1)$$

or $$\text{Rs. } 100 = \frac{1}{1+0.10}(0 + P_1)$$

or $$\text{Rs. } 100 = \frac{P_1}{1.10}$$

or $$\text{Rs. } 100 \times 1.10 = P_1$$

or $$P_1 = \text{Rs. } 100$$

(*ii*) Funds to be raised from new issue of shares :

$$\Delta nP_1 = I - (E - nD_1)$$

$$= \text{Rs. 4 Crore} - (3 \text{ Crore} - 0)$$

$$= 1 \text{ Crore}$$

No. of Additional Shares to be issued :

$$\Delta n = \frac{\text{Rs. 1 Crore}}{\text{Rs. 110 per share}} = 90{,}909 \text{ Shares Approx.}$$

Q. 7. Using the data given below :

EPS	7
P/E	10
K_e	12%
No. of outstanding shares	75,000
Expected Dividend	5
Expected Net Income	5,00,000

New Investment 8,00,000

Show, using MM hypothesis, the payment of dividend does not affect value of the firm.

(D.U. B.Com. Hons. 2007)

SOLUTION :

$$P_o = \frac{1}{1+K_e}(D_1 + P_1)$$

where, $P_o = EPS \times P/E$

$= 7 \times 10 = \text{Rs. } 70$

(*i*) Market Price of the share when dividend is declared :

$$70 = \frac{1}{(1+0.12)}(\text{Rs. } 5 + P_1)$$

$$70 \times 1.12 = \text{Rs. } 5 + P_1$$

$$P_1 = \text{Rs. } 73.40$$

Funds to be raised from new issue of shares :

$$\Delta n P_1 = I - (E - nD_1)$$

$= \text{Rs. } 8,00,000 - (\text{Rs. } 5,00,000 - 75,000 \text{ Shares} \times \text{Rs. } 5)$

$= \text{Rs. } 6,75,000$

Number of additional shares to be issued :

$$\Delta n = \frac{\text{Rs. } 6,75,000}{\text{Rs. } 73.40} = 9,196.19 \text{ Approx.}$$

Value of Firm :

$$nP_o = \frac{(n+\Delta n)P_1 - I + E}{1+K_e}$$

$$= \frac{(75,000+9,196.19)\,73.40 - 8,00,000 + 5,00,000}{1+0.12}$$

$= \text{Rs. } 52,50,000$

(*ii*) Market Price of the share when dividend is not declared :

$$70 = \frac{1}{(1+0.12)}(0 + P_1)$$

$$70 \times 1.12 = P_1$$

$$P_1 = \text{Rs. } 78.40$$

Funds to be raised from new issue of shares :

$$\Delta n P_1 = I - (E - nD_1)$$

$$= \text{Rs. } 8,00,000 - (5,00,000 - 0)$$

$$= \text{Rs. } 3,00,000$$

Number of additional shares to be issued :

$$\Delta n = \frac{\text{Rs. } 3,00,000}{\text{Rs. } 78.40} = 3,826.53 \text{ Approx.}$$

Value of Firm :

$$nP_o = \frac{(n+\Delta n)P_1 - I + E}{1+K_e}$$

$$= \frac{(75,000+3,826.53)\,73.40 - 8,00,000 + 5,00,000}{1+0.12}$$

$$= \text{Rs. } 52,50,000$$

Q. 8. Z Ltd. has 10 lakh equity shares outstanding at the beginning of the year 2006. The current market price of the shares is Rs. 150 each. The company recommended Rs. 8 per share as dividend. The capitalisation rate is 12%.

(*i*) Based on MM approach, calculate the market price of the share of the company when the recommended dividend is (*a*) declared, and (*b*) not declared.

(*ii*) How many new shares are to be issued by the company at the end of the accounting year on the assumption that the net income for the year is Rs. 2 crores and the investment budget is Rs. 4 crores when dividends are distributed? What will be the market value of shares at the end of accounting year?

SOLUTION :

(*i*) (*a*) Market Price of the share, when dividends are declared :

$$P_o = \frac{1}{1+K_e}(D_1 + P_1)$$

$$\text{Rs. } 150 = \frac{1}{(1+0.12)}(\text{Rs. } 8 + P_1)$$

$$\text{Rs. } 150 = \frac{1}{(1.12)}(\text{Rs. } 8 + P_1)$$

$$\text{Rs. } 150 \times 1.12 = \text{Rs. } 8 + P_1$$

$$\text{Rs. } 168 = \text{Rs. } 8 + P_1$$

$$P_1 = \text{Rs. } 160$$

(*b*) Market Price of the share, when dividends are not declared :

$$P_o = \frac{1}{1+K_e}(D_1 + P_1)$$

$$\text{Rs. } 150 = \frac{1}{(1+0.12)}(0 + P_1)$$

$$\text{Rs. } 150 = \frac{1}{(1.12)}$$

$$\text{Rs. } 150 \times 1.12 = P_1$$

$$P_1 = 168$$

(*ii*) Funds to be raised from new issue of shares :

$$\Delta nP_1 = I - (E - nD_1)$$

= Rs. 4 Crore – (Rs. 2 Crore – Rs. 80 Lakh)

= Rs. 2.80 Crore

Number of additional shares to be issued :

$$\Delta n = \frac{\text{Rs. 2.80 Crore}}{\text{Rs. 160 per share}} = 1{,}75{,}000$$

Market value of the shares at the end of the accounting year :

Toral Shares = 10,00,000 + 1,75,000 =11,75,000

Market Value of the Shares = 11,75,000 × Rs. 160 = Rs. 18,80,00,000

DELHI UNIVERSITY EXAMINATION QUESTIONS

Q.1. From the following information taken from the books of a manufacturing concern, compute the operating cycle in days :

Period covered	365 days
Average period of credit allowed by suppliers	16 days
	(Rs. in '000)
Average debtors outstanding	480
Raw materials consumption	4,400
Total production cost	10,000
Total cost of sales	10,500
Sales for the year	16,000

Value of average stock maintained :

Raw materials	320
Work-in-progress	350
Finished goods	260

(D.U. B.Com. Hons. 1998)

SOLUTION : **Computation of Operating Cycle**

(1) Raw Materials Conversion Period :		
$\frac{\text{Average Stock of Raw Material}}{\text{Raw Materials Consumed}} \times 365$	$= \frac{320}{4,400} \times 365$	= 27 Days
(2) Work in Progress Conversion Period :		
$\frac{\text{Average Stock of Work in Progress}}{\text{Total Cost of Production}} \times 365$	$= \frac{350}{10,000} \times 365$	= 13 Days
(3) Finished Goods Conversion Period :		
$\frac{\text{Average Stock of Finished Goods}}{\text{Total Cost of Sales}} \times 365$	$= \frac{260}{10,500} \times 365$	= 9 Days
(4) Debtors Conversion Period :		
$\frac{\text{Average Debtors}}{\text{Sales}} \times 365$	$= \frac{480}{16,000} \times 365$	= 11 Days
		60 Days
Less : Average Period allowed by Suppliers		16 Days
Net Operating Cycle		44 Days

Q. 2 ABC Ltd. expects its cost of goods sold for 2000-2001 to be Rs. 600 lacs. The expected operating cycle is 90 days. It wants to keep a minimum cash balance of Rs. one lac. What is the expected working capital requirement? Assume a year consists of 360 days.

SOLUTION :

Working Capital Requirement :

	Rs.
Cash Balance required	1,00,000
Working Capital required for Cost of goods sold :	
$600 \text{ Lacs} \times \frac{90}{360}$	1,50,00,000
Total Working Capital Requirement	1,51,00,000

Q. 3. AB Ltd. provides the following particulars relating to its working :

	Amount in Rs. *(Per Unit)*
(*i*) Cost / Profit per unit :	
Raw Material Cost	84
Direct Labout Cost	36
Overheads (All Variable)	36
Total Cost	156
Profit	44
Selling Price	200

(*ii*) Average Amount of Backup Stock :

Raw Material	1 month
Work-in-Progress (50% Complete)	$\frac{1}{2}$ month
Finished Goods	1 month

(*iii*) Credit allowed by Suppliers 1 month

(*iv*) Credit allowed to Customers 2 month

(*v*) Average time lag in the payment of :

Wages	$\frac{1}{2}$ month
Overhead Expenses	$1\frac{1}{2}$ month

(*vi*) Required Cash in hand and at Bank Rs. 3,00,000.

(*vii*) 25% fo the output is sold for cash.

For an expected sale of 1,00,000 units of AB Ltd., work out the working capital requirements assuming that production is carried on evenly throughout the year and wages and overheads accrue similarly. *(D.U. B.Com. Hons. 2001)*

SOLUTION :

COMPUTATION OF NET WORKING CAPITAL REQUIREMENTS

Current Assets :		**Rs.**	**Rs.**
(*i*) Stock of Raw Material	$1,00,000 \times 84 \frac{1}{12}$		7,00,000
(*ii*) Work-in-Progress[1]	$1,00,000 \times 120 \times \frac{1}{24}$		5,00,000
(*iii*) Stock of Finished Goods	$1,00,000 \times 156 \times \frac{1}{12}$		13,00,000
Debtors :	$75,000 \times 156 \times \frac{2}{12}$		19,50,000
Cash			3,00,000
			47,50,000
Less : **Current Liabilities :**			
Creditors	$1,00,000 \times 84 \times \frac{1}{12}$	7,00,000	

Outstanding Payments for:

Labour	$1,00,000 \times 36 \times \frac{1}{24}$	1,50,000	
Overheads	$1,00,000 \times 36 \times \frac{1.5}{12}$	4,50,000	13,00,000
Net Working Capital Requirement :			34,50,000

Note: (1) Cost of each unit of Work in Progress :

		Rs.
Raw Materials		84
Direct Labout Cost	(50% or Rs. 36)	18
Overheads	(50% or Rs. 36)	18
		120

Q. 4. Pranshu Ltd. plans to sell 30,000 units next year, The expected cost of goods is as follows :

	Rs. (per unit)
Raw Materials	100
Manufacturing expenses	30
Selling, Administration and Financial expenses	20
Selling Price	200

The duration at various stages of operating cycle is expected to be as follows :

Raw Material stage	2 months
Work-in-progress stage	1 month
Finished goods stage	1/2 month
Debtors stage	1 month

Assuming monthly sales level of 2,500 units, estimate the gross working capital requirements if the desired cash balance is 5% of the gross working capital requirements and work-in-progress is 25% complete with respect to manufacturing expenses. *(D.U. B.Com. Hons. 2005)*

SOLUTION :

STATEMENT OF GROSS WORKING CAPITAL REQUIREMENTS

	Rs.
Current Assets :	
Stock of Raw Material (2 months) : 2,500 × 2 × Rs. 100	5,00,000
Work in Progress(1) (1 month) : 2,500 × Rs. 107.50	2,68,750
Stock of Finished Goods(2) $\left(\frac{1}{2}\text{ month}\right)$: $2,500 \times \frac{1}{2} \times$ Rs. 130	1,62,500
Debtors (1 month) : 2,500 × Rs. 150 (at Cost of sales)	3,75,000
	13,06,250
Cash Balance : $13,06,250 \times \frac{5}{95}$	68,750
Gross Working Capital Requirement	13,75,000

Working Note :

(1) Cost of each unit of Work in progress :

	Rs.
Raw Material	100
Manufacturing Exp. (25% of Rs. 30)	7.50
	107.50

(2) Selling expenses are not included while valuing stock of finished goods.

Q. 5. From the following information, prepare an extimate of working capital requirements:

Projected annual sale	52,000 units
Selling Price	Rs. 60 per unit
Raw Material Cost	40% of selling price
Direct Labour Cost	30% of selling price
Overheads	20% of selling price

Raw materials remain in stock on an average for 3 weeks. Goods remain in production process for 4 weeks on an average. 5 weeks are allowed to debtors to pay while firm gets 3 weeks credit from suppliers. Finished goods remain in stock for one month. Lag in the payment of wages and overhead expenses in two weeks. 50% of the sales are on cash basis. Assume that goods in process are 100% complete with respect to materials but only 50% in conversion costs.

(D.U. B.Com. Hons. 2006)

SOLUTION :

		Rs.
Raw Material Cost per unit	40% of Rs. 60	24
Direct Labour Cost per unit	30% of Rs. 60	18
Overheads per unit	20% or Rs. 60	12
Total Cost per unit		54

Calculation of Net Working Capital :

(Weekly Sale : 52,000 ÷ 52 = 1,000 Units)

Current Assets :		
Stock of Raw Material :	1,000 × 24 × 3	72,000
Work in Progress(1) :	1,000 × 39 × 4	1,56,000
Stock of Finished Goods :	1,000 × 54 × 4	2,16,000
Debtors : (50% sales are on cash basis)	500 × 54 × 5	1,35,000
		5,79,000
Less : **Current Liabilities :**		
Creditors :	1,000 × 24 × 3 = 72,000	
Direct Labour :	1,000 × 18 × 2 = 36,000	
Overheads :	1,000 × 12 × 2 = 24,000	1,32,000
Net Working Capital Requirement		4,47,000

Note : (1) Work in Progress :

			Rs.
	Raw Material		24
+	Direct Labour	(50% of Rs. 18)	9
+	Overheads	(50% or Rs. 12)	6
			39