

# FINANCIAL MANAGEMENT

(DCM04)

(MCOM)



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## LESSON - 1

**FINANCIAL MANAGEMENT : AN OVERVIEW****Objectives**

After studying this lesson, you should be able to :

- P know the meaning of Finance and scope of Financial Management
- P discuss the various financial objectives of a company
- P analyse the Financial goals of a company
- P familiarise the major decisions involved in Finance Function
- P explain the concept of time value of money

**Structure :**

- 1.1. Introduction**
- 1.2. Meaning of Finance**
- 1.3. Scope of Financial management**
- 1.4. Role of Financial Manager**
- 1.5. Finance Functions**
- 1.6. Organisation of Finance Function**
- 1.7. Financial Goals of the company**
- 1.8. Financial Decisions**
- 1.9. Time value of Money**
- 1.10. Summary**
- 1.11. Keywords**
- 1.12. Self assessment questions**
- 1.13. Further Readings**

**1.1. Introduction**

Business is an economic activity which involves the use of economic resources (machine, material, money, men, etc) for the production of goods (refrigerator, tooth paste, soap, truck etc) and services (insurance, banking, communication, transport, etc). These goods and services are expected to be sold at a price which is more than the cost of producing them, resulting in a surplus or profit.

When a business enterprise plans to do any activity, it has to make a market survey to estimate the demand for the product and to estimate the life of the business.



The demand estimate helps in the finalisation of plant capacity (i.e; number of units a plant can manufacture in a specific period of time) or scale of operations. Once the plant capacity is finalised, the area of the site required to construct the business premises (consisting factory buildings, godowns, office building etc); number or personnel (human resource) required, raw material requirement are estimated. The enterprise finalises its scale of operations and based on it, the capital (both permanent and working capital) requirement is estimated.

Depending upon the nature of business, the size of capital varies. A business with manufacturing activity requires more capital than what is required for a trading business or service organisations. Business of providing services like transportation, communication, banking, insurance, warehousing, etc. involves the need for estimating the capital requirement (i.e; amount of money that is required for investment in various assets)

Once capital requirement is estimated, the enterprise has to find sources of mobilising these funds. It has to identify sources for meeting the permanent capital requirement (i.e; to acquire plant, machinery buildings, technical know-how, patents etc.) and short-term capital requirement (i.e; to buy raw material, to pay for labour etc). From among the various sources that provide long term or short term funds an enterprise has to choose.

A business enterprise strives to achieve a surplus. To achieve this goal, an enterprise invests funds in various income earning assets by obtaining funds from various sources. Thus, the financial function is all about the following activities.

- P to determine the funds requirement
- P to determine the assets to be acquired
- P to determine the pattern of financing the assets.

## 1.2. Meaning of Finance

P According to the Encyclopedia Britanica **finance** is “the act of providing the means of payment”

P Howard and Upton defines **finance** “as the management of the flow of cash so that the organisation will have the means to carry out its objectives and at the same time meet its obligations as they become due”!

P Wheeler defines **business finance** as “that **business** activity which is concerned with the acquisition and conservation of capital funds in meeting the financial needs and overall objectives of business enterprises”

## 1.3. Scope of Financial management

### (a) Meaning

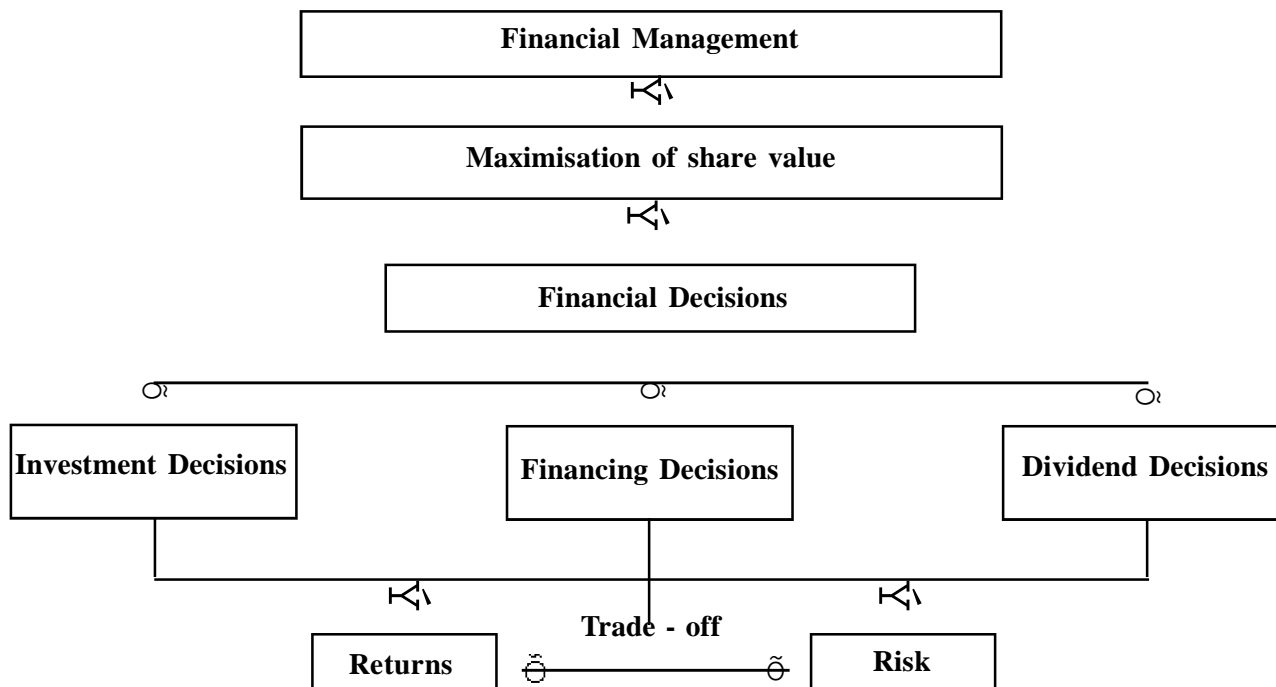
According to Guthmann and Dougall, business finance can be broadly defined as “ the activity concerned with the planning, raising, controlling and administering the funds used in the business”

Financial Management refers to that part of the management activity which is concerned with the planning and controlling of firm’s financial resources.

Financial Management study about the process of procuding and judicious use of financial resources with a view to **maximise** the value of a business enterprise thereby the value of the owners is maximised.

In a company form of organisation, according to James C Van Horne financial management, endeavours to make optimal investment, financing and dividend decisions.

**(b) Objectives of a company :**



**Figure 1.1. : An Overview of Financial Management**

**1.4. Role of a Financial Manager**

The functions of a financial manager of a company generally include the following:

- P Estimates capital requirement of various projects.
- P Provides funds for various projects.
- P Maintains liquidity and solvency to meet the short-term and long term commitments, when they become due
- P Liason with stock exchanges, shareholders, bankers, financial institutions
- P Estimates risk in financial decisions and provide for various measures to minimise risk.
- P Decides the credit policy of the company by taking into consideration the established practices.
- P Reports to various external agencies like financial institutions, tax authorities, shareholders, govt.
- P Meets various obligations under different legislations, like tax laws, SEBI Act, etc.

- P Takes - up internal audit to establish proper checks and controls.
- P Decides the dividend policy of the company.

All the above mentioned functions are supposed to be discharged by a Financial Mmanager, with in the frame work of laws in force, for the ultimate achievement of wealth maximisation of shareholders.

### 1.5. Finance Functions.

Finance Functions are important activities in the business management irrespective of nature, size, age and structure of the organisation. A business finance function expresses the relationship between value of a business enterprise and its various determinants. Value of a business enterprise is nothing but its net worth to the owners. Net worth is the difference between the market value of assets and the value of liabilities (outsiders' claims)

$$\text{Net Worth} = \text{Assets} - \text{Liabilities}$$

If net worth of a business enterprise increases it can be interpreted that the value of a business enterprise is rising. The value of a business depends upon the following factors.

#### 1.5.1 Internal :

- P Investment activities
- P financing mix
- P distribution of profits

#### 1.5.2 External :

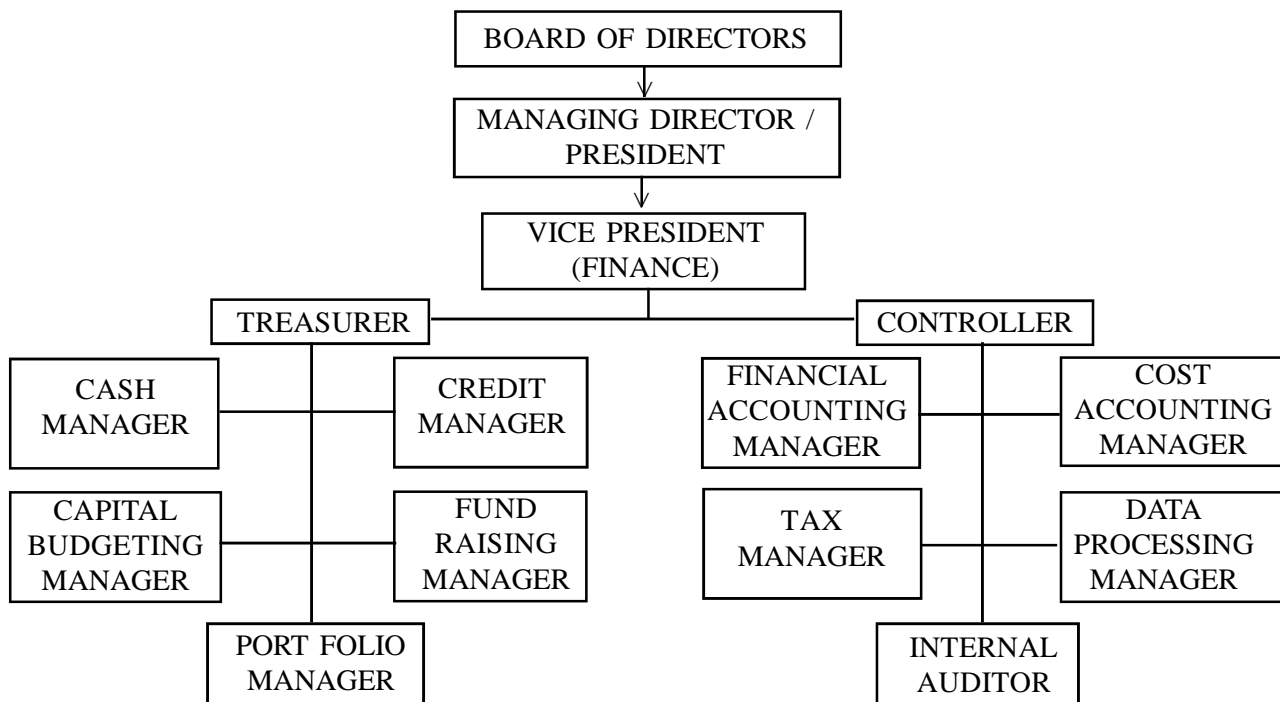
- P State of the economy
- P Capital market conditions,
- P Tax rates

Among these factors some are controllable and some are uncontrollable. Assuming that the uncontrollable factors are held constant, the value of a business is a function of internal or controllable factors. Therefore, value of a business is a function of investment, financial, distribution of profits.

$$V = f [I, F, D]$$

### 1.6. Organisation of Finance Function

Finance is an integral part of a company. All functional areas of management are related to finance function. Production, marketing, human resource etc. are related to finance. In the area of finance specific tasks are performed by specialists. The organisation of finance function can be better understood by the following figure 1.1



**Figure 1.2**  
**Organisation of Finance Function**

### 1.7. Financial goals of the company

Company is a form of organisation in which the ownership and management are separated. Shareholders are the owners and the board of directors are the agents of the shareholders. The team of management takes various decisions involving the profitability and perpetuity of the company. When these strategic decisions are taken, what should be the goal of the firm? It is the fundamental question which automatically leads us to the economic benefit to the shareholders. As shareholders provide capital and face maximum risk, they expect the company to provide them maximum return.

There are two widely discussed approaches to achieve the above objective.

- (a) Profit maximisation
- (b) Wealth maximisation

Should the company aim at maximising profit or wealth?

### 1.7.1. Profit Maximisation :

Business is an economic activity, where scarce resources are used to produce goods and services. Business activities involve costs and revenues. The unique measure of efficiency is surplus, i.e., the excess of revenues **over costs**, which is popularly known as profit. Therefore a company should aim at profit maximisation. This goal can be justified on the following grounds.

1. Economic activity aims at utility maximisation. Utility is measured in terms of profits.
2. Profit is a measure of economic efficiency
3. Profit leads to efficient allocation of resources
4. It ensures maximum social welfare
5. It leads to efficient use of important and scarce resources.

**Profit maximisation goal of a company is having the following limitations.**

i) **Ambiguity :** The goal of profit maximisation is considered to be very vague and ambiguous. Profit has various connotations and amenable to different interpretations by various persons. For example, profit may be,

short run profit            or        long run profit, total profit or rate of profit,  
 after tax profit            or        Before tax profit,  
 return on equity            or        return on total capital employed.

There will be always a dilemma as to which of these variations of profits should a company try to maximise.

ii) **It ignores the timing of benefits :** The goal of profit maximisation ignores the differences in the timing of benefits from investment. Between two alternative projects which have different time pattern of profits, the goal makes no difference. For example, project A and project B have the following profits

**Time Pattern of Profits**

Year Rs	Project A Rs	Project B
1	5000	15000
2	10000	10000
3	15000	5000
Total Profit	30000	30000
Average Profit	10000	10000

Project B is providing high early returns. Basic dictum of financial planning is “EARLIER THE BETTER”. According to this principle, Project B is preferable. Profit maximisation goal ignores time value of money.

iii) **It ignores the Quality of Benefits :** If the expected profits are more certain, with low range of variation the quality is considered to be high. Goal of profit maximisation ignores the quality of benefits. And it does not give weightage to the risk associated with the profits. The following table reveals the above

#### Quality of Benefits

State of the economy	Profit per Annum	
	Project A Rs	Project B Rs
Recession (pessimistic)	9000	0
Normal (most likely)	10000	10000
Boom (optimistic)	11000	20000
Average	10000	10000

Between these two projects, project A has high quality profits as the range is low [Rs 11000 - Rs 9000 = Rs 2000], where as Project B has higher range [Rs 20000 - 0 = 20000] indicating poor quality profits

Profit maximisation goal fails to distinguish between these projects. Therefore, the Profit maximisation by itself cannot be an objective if it results in a disadvantage to the owners or shareholders. If a company invests in new projects by bringing in new capital through the issue of shares, the new profits may not result in the increase of earnings per share (EPS). If the return on the new project is less than what the company has been earnings, the earnings per share will decrease.

Search for high profits may result in the collapse of the company, as it involves high degree of risk. And goes against the interest of the shareholders who are bearing the maximum risk. Therefore, profit maximisation is not considered to be an appropriate goal.

The goal of EPS maximisation also suffers from the following limitations : (i) its does not specify the time of expected returns (ii) it does not consider risk associated with future earnings, and (iii) it does not take into account the financial risk.

**1.7.2. Wealth maximisation :** Principle of maximisation of shareholders wealth is the rational guide for running a business. The goal of a company is to maximise the present wealth of the owners i.e. equity shareholders in a company. Company's equity shares are actively traded in the stock market. Shareholders wealth is represented by the market value of equity holdings. Market price of share acts as an index of performance of a company. Shareholders' wealth maximisation means the maximisation or market price of share (MPS). If MPS is a measure of efficiency, the goal or maximisation of wealth helps in the efficient allocation of financial resources in a society.

**Implications of Wealth Maximisation :**

- P The goal aims at prosperity and perpetuity of a company.
- P The goal helps in measuring the performance of a company
- P The goal helps in allocation / reallocation of scarce resources
- P It helps the company in discharging its responsibilities effectively, such as
  - \* Consumer protection
  - \* Payment of fair wages
  - \* Provision of safe working conditions.
  - \* Environmental protection.
  - \* Support to social problems.
- P It leads to efficient use of scarce and precious resources
- P It considers risks associated

**What is Wealth Maximisation ?**

Wealth maximisation means maximising the net present value of a course of action. Net present value (NPV) is the difference between present value of expected benefits and present value of costs.

If the benefits at end of each each year are

$$A_1, A_2, A_3, \dots, A_n$$

the present value of these benefits can be calculated by discounting the future benefits by using a discounting factor, i.e.,

$$\frac{A_1}{(1+K)}, \frac{A_2}{(1+K)^2}, \frac{A_3}{(1+K)^3}, \dots, \frac{A_n}{(1+K)^n}$$

Sum of these present values is the PV of future benefits .

If costs at the end the of each year, are

$$C_0, C_1, C_2, C_3, \dots, C_n$$

Their present value the investments is calculated as under :

$$C_0, \frac{C_1}{(1+K)^1}, \frac{C_2}{(1+K)^2}, \frac{C_3}{(1+K)^3}, \dots, \frac{C_n}{(1+K)^n}$$

Sum of these present values is the PV of costs of investment

$$NPV = PV \text{ of Benefits} - PV \text{ of costs}$$

$$= \left[ \frac{A_1}{(1+K)} + \frac{A_2}{(1+K)^2} + \dots + \frac{A_n}{(1+K)^n} \right] - \left[ C_0 + \frac{C_1}{(1+K)} + \frac{C_2}{(1+K)^2} + \dots + \frac{C_n}{(1+K)^n} \right]$$

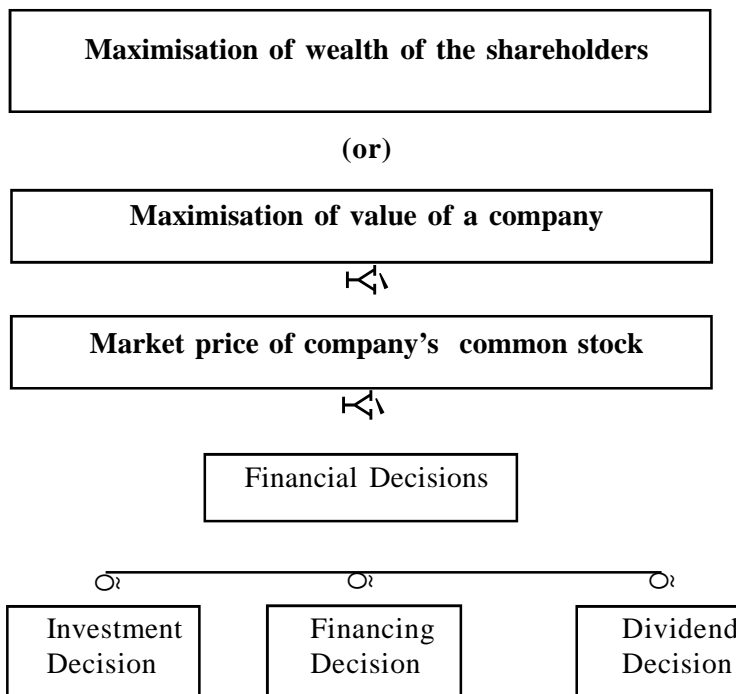
$$NPV = \left[ \sum_{t=1}^n \frac{A_t}{(1+K)^t} \right] - \left[ \sum_{t=0}^n \frac{C_t}{(1+K)^t} \right]$$

In the above equation K refers to the discount rate and t refers to the time period.

Every financial decision involves costs and benefits and also result in NPV. Maximisation of this NPV is construed as maximising wealth of financial decisions which have a long term impact on the company. They are strategic, crucial and which involve risk are

- P Investment decision
- P Financing decision
- P Dividend decision

These decisions taken with an objective of maximising Net Present Value (NPV) result in value maximisation of the company and inturn wealth maximisation of shareholders.



Value of a company = f [Investment, Financing, Dividend decision]

$$V = f [I, F, D]$$



## 1.8. Financial Decisions

The above said activities of Finance Functions are classified as three major Financial Decisions.

Three major decisions, which are strategic, crucial, which have long term impact and which cannot be reversed without abnormal losses are

- (a) Investment decision
- (b) Financing decision
- (c) Dividend decision

**1.8.1. Investment decision :** Investment decision relate to the selection of projects or investment opportunities which are financially viable. The process of investment decision involve the following steps

- Generation of investment ideas or opportunities
- Defining the objective in quantitative terms
- Evaluation of each opportunity using techniques of evaluation
- Selection of the best alternative investment
- Implementation of the best investment
- Follow up or monitor whether the investment is providing expected return.

Decisions like (a) make or buy, (b) buy or lease, (c) outright purchase or hire purchase, (d) replacement of manual activities with machine is action, (e) replacement of out / dated technology with latest technology (f) replacement of worn out machinery with a new machine, (g) mergers (h) amalgamation (i) acquisitions , (j) introduction of a new product (k) expansion (l) entering foreign market are some of the investment decisions taken by Financial Manager.

These decisions are based on estimates related to the future. When future is uncertain, there is a chance that actual outcome may deviate from the estimated outcome. This change is called risk. Therefore measurement of risk in the investment decisions is essential and crucial.

## 1.8.2. Financing Decision :

Funds are required in business for financing investment projects and for financing business operations. Thus the financing decision is related to the procurement of funds. Funds can be procured from various forms and in different forms. Equity share capital, preference share capital, debentures , company deposits, long term loans from financial institutions, inter corporate borrowings, bank loans, bank overdraft, cash credit are some of the sources. These sources are broadly divided into : (a) long term, and (b) short term. Some of these sources involve fixed financial commitment on the part of the company.

Equity is ownership capital when as the creditorship capital (debt) involving fixed interest commitment on the part of the company. Preference share capital is a hybrid source with some features of both equity and debt.

Financing decision is related to judicious mix of debt and equity. It decides the capital structure of a company. and also related to the mix of short and long term sources. When investment decision is a trade off between return and risk, financing decision is a trade off between cost and risk. Investment decision involves business or operating or investment risk. Financing decision involves financial risk.

Financial decisions are

- ➔ Determination of degree of leverage
- ➔ Raising funds through equity and debt and also raising funds from long term and short term sources
- ➔ Consideration of tax benefit of usage of debt

### 1.8.3. Dividend Decision :

Dividend decision is indirectly a financing decision. If sources of funds are classified as internal and external sources, all the sources discussed under the 'financing decision' are external sources. Dividend decision relates to the distribution of profits among the equity shareholders.

No business enterprise will distribute all the profits to the owners. Some of the profits are retained for future purposes of the business. These retained profits are considered as internal source. These retained profits belong to the existing shareholders. Net worth of the shareholders is a sum of equity share capital plus retained earnings. If net worth increases the book value of share increases. It will have a favourable impact on the market price of the shares.

Dividend decision is concerned with the determination of dividend pay-out ratio (percentage earnings to be distributed by way dividends). Dividends provide current earnings to the shareholders, whereas, retained earnings increase the scope for higher future earnings. Taking into consideration the company's future investment opportunities, the company's ability to tap the capital market, tax effect, shareholder's expectations, etc, a dividend decision has to be taken.

Thus, the investment, financing and dividend decision are interrelated. Their impact on the value of the company should be taken into consideration. As they affect the market value of the share by influencing return and risk. The relationship between return and risk can be calculated as :

$$\text{Return} = \text{Risk - free rate} + \text{Risk premium}$$

Where the risk free rate is a compensation for time and risk premium for wish comage. In order to maximise the market value of the firm, a proper balance between return and risk should be maintained. This balance is known as risk - return trade - off, which is shown in Figure 1.3.

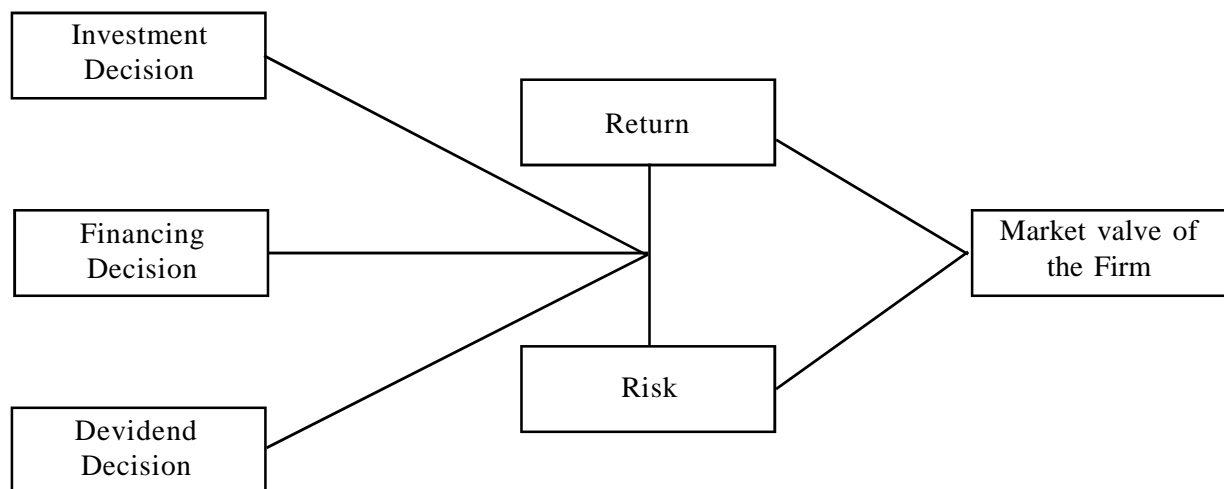
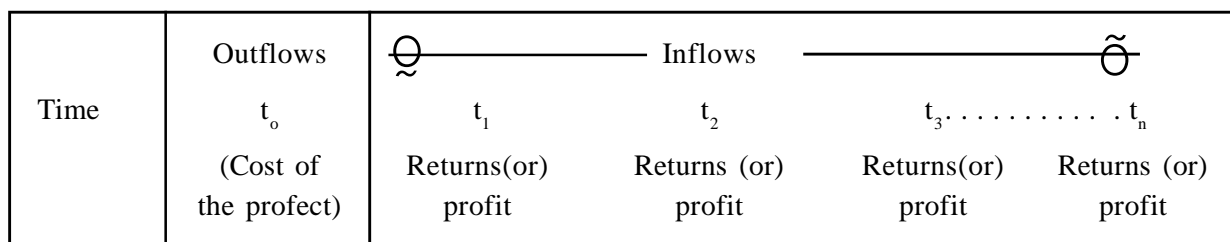


Figure 1.3. : Trade - off between Return and Risk

**1.9. Time Value of Money**

An important principle in finance is that the value of money is dependent on time. The value of money received today is different from the value of money received after sometime in the future. The principle is based on the fact that what we receive today can be invested and a return can be earned on it. For example, between Rs 100 now or Rs 100 after one year, Rs 100 now will have more time value because it can be invested, for example at 10% rate of interest, and a return of Rs 10 can be earned. Rs 100 becomes Rs 110 a year after.

In business, various decisions involve outflow and inflow of funds. Outflows and the inflows do not take place at the same time. For example, in the case of investment decision outflows in the form of cost of the project takes place first and it is followed by inflows in the form of profits or returns in future.



The difference in their timing makes it difficult to compare the costs and benefits. Therefore there is a need to equalise the time values of inflows and outflows for this Time value can be incorporated into financial decisions either by compounding or by discounting.

Let us try to understand these methods.

**1.9.1. Compounding :** Compounding is the process of finding the Future Value of an amount (which is called present value) at the end of a period using an interest rate. For example, if we want to find the future value of Rs 100 (PV) at the end of one year when interest rate (r) is 12 percent per annum

$$\begin{aligned}
 FV &= \text{Present value} + \text{Interest for one year at 12\%} \\
 FV_1 &= PV + PV (r) = PV (1+r) \\
 FV_1 &= Rs 100 + 100 (12\%) = Rs 100 + Rs 12 = Rs 112. \\
 \text{If we wish to find FV at the end of second year} \\
 FV_2 &= FV_1 + \text{Interest of second year at 12 \%} \\
 &= FV_1 + FV_1 (\text{interest rate}) \\
 &= FV_1 + FV_1 (r) \\
 &= FV_1 (1 + r)
 \end{aligned}$$

We know that  $FV_1 = PV (1 + r)$

$$FV_2 = PV (1 + r) (1 + r) = PV (1 + r)^2$$

Future value at the end of n years

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

**Compounding more than once :**

$$\text{Twice in a year} \quad \text{FV} = \text{PV} \left[ 1 + \frac{r}{2} \right]^{2n}$$

$$\text{Quarterly compounding} \quad \text{FV} = \text{PV} \left[ 1 + \frac{r}{4} \right]^{4n}$$

$$\text{Yearly compounding} \quad \text{FV} = \text{PV} \left[ 1 + \frac{r}{12} \right]^{12n}$$

$$m \text{ times a year} \quad \text{FV} = \text{PV} \left[ 1 + \frac{r}{m} \right]^{mn}$$

As 'm' approaches infinity, the term

$$\left[ 1 + \frac{r}{m} \right]^{mn} \text{ approaches } e^{rn}$$

Where  $e = 2.71828$  approximately.

$$\text{FV} = \text{PV} e^{rn}$$

Where

FV = future value

PV = present value

r = rate of interest

n = number of years.

Continuous compounding results in the maximum possible future value at the end of n periods for a given rate of interest (r).

**1.9.2. Discounting** - Discounting is the process of finding the present value of an amount (future value) expected to be received at the end of a period (n) using a rate of interest (called the discount rate). If we want to find the present value of Rs 100 to be received at the end of one year, when the rate of interest is 12 per cent

$$\text{PV} = \frac{\text{FV}}{(1+r)} = \frac{100}{1+12\%} = \frac{100}{1.12} = \text{Rs. } 89.29$$

It means that the present value of Rs 100 to be received at the end of one year, when discounted at 12%, is Rs 89.29.

$$\text{PV of Rs 100 to be received at the end of } n \text{ years } \text{PV} = \frac{\text{FV}}{(1+r)^n}$$

You are provided with two types of Tables in the Appendix

- (a) Compound / future / terminal value Tables
- (b) Present value Tables.

### **Compound value Tables :**

By making use of these tables, we can find the compound value of any amount, for any period, at any rate. In these Tables compound values of Re.1 are provided.

In the compound value formula, the value of the expression  $(1 + r)^n$  is given for Re. 1 for a given rate and period. For example, when

$$PV = \text{Rs } 1300 \quad r = 13\% \quad n = 15 \text{ years,}$$

What is compound value or ?

$$CV = PV (1 + r)^n = \text{Rs } 1300 (1 + 0.13)^{15}$$

the value of  $(1 + 0.13)^{15}$  is given in the Table for Re.1. We can find the C V just multiplying Rs. 1300 with this value which is called compound factor.

$$\begin{aligned} CV &= \text{Rs } 1300 \times \text{Compound factor } (n = 15 \text{ years, } r = 13\%) \\ &= \text{Rs } 1300 \times 6.254 \\ &= \text{Rs } 8,131 \end{aligned}$$

For any period and at any rate, we can find the compound value by using these Tables.

### **Present value tables :**

By making use of these Tables, we can find the present value of any amount. In the present value formula, the value of the expression  $[1/(1+r)^n]$  for Re.1 is given for a given discount rate and period (n).

#### **For example :**

If we wish to know the present value of Rs 5000 to be received at the end of 18 years with a discount rate 15 per cent, then

$$FV = \text{Rs } 5000, \quad r = 15\% \quad n = 18 \text{ years.}$$

$$PV = FV \left[ \frac{1}{(1+r)^n} \right]$$

the value of the expression shown in the praranthies can be found out from PV Tables for any n, r.

$$\begin{aligned} PV &= FV \times \text{PV Factor (given r, n)} \\ &= FV \times \text{discount factor (given r, n)} \end{aligned}$$

$$\begin{aligned} PV &= \text{Rs } 5000 \times \text{PV factor } (a + r = 5\%, n= 18 \text{ years}) \\ &= \text{Rs } 5000 \times 0.081 \\ &= \text{Rs } 405 \end{aligned}$$

It means that, the PV of Rs 5000 to be received at the end of 18<sup>th</sup> Year is Rs 405 when discounted at 15 per cent rate.

**Annuity** : An Annuity is a stream of constant cash flows (payment or receipt) occurring at regular intervals of time. When cash flows occur at the end of each period we can find the future value by compounding and present value by discounting.

Compound value of annuity. Future or compound value of an annuity (FVA) can be calculated by using the following formula.

$$\text{FVA} = \text{Annuity amount} \times \left[ \frac{(1+r)^n - 1}{r} \right]$$

In the above equation,  $\left[ \frac{(1+r)^n - 1}{r} \right]$  expression is compound factor for one rupee annuity received at the end of each year for n years with 'r' compound interest rate.

Compound value Tables given in the Annexure contain CV of annuity of Re.1 for a given period and rate.

**For example :**

If we wish to find the compound value of Rs 1200 annuity for a period of 10 years and when the interest rate is 12 per cent. Future value of annuity at the end of 10 years will be

$$\begin{aligned} \text{FV}_{10} &= \text{Rs } 1200 \times \text{CV of annuity of Re.1 (r = 12\%, n = 10 years)} \\ &= \text{Rs } 1200 \times 17.549 \\ &= \text{Rs. } 21058.80 \end{aligned}$$

**Present value of Annuity :**

Present value of an annuity (PVA) can be calculated by using the following formula.

$$\text{PVA} = \text{Annuity amount} \times \left[ \frac{1 - \frac{1}{(1+r)^n}}{r} \right]$$

The expression  $\left[ \frac{1 - \frac{1}{(1+r)^n}}{r} \right]$  is given for Re.1 Annuity Table in the Annexure for given r and n.

For example, if we want to find the present value of Rs 1000 annuity for 10 years when the discount rate is 12 %, we can find the present the value of Re.1 annuity from the Table and multiply it with Rs 1000.

Annuity = Rs 1000  $r = 12\%$   $n = 10$  years

PVA = Rs 1000 X 5.650

= Rs 5650

Having understood the methods of incorporating time value of money, through compounding and discounting, let us now see, how these methods are relevant in financial decision making.

### 1.9.3. Financial Decisions : Time value of Money

**(a) Investment Decision :** Investment decision involves current cash outlay for expected stream of cash inflows in future.

Time	$t_0$	$t_1$	$t_2 \dots \dots \dots t_n$
cash flows	Current Cash outlay (Co)	cash inflow	cash inflow

The cash flows (outflows and inflows) occur at different timings. Therefore, they are not comparable. Time value of money is taken into consideration by discounting the cash inflows to find the present value of all cash inflows. Then PV of cash inflows is compared with current cash outlay or cost of an investment project.

**For example :** A project costs Rs.100000. It is expected to provide cash inflows as follows for 3 years. The company's cost of capital or required rate of return is 15%. Whether the project is acceptable?

Year	1	2	3
cash Inflows	Rs 40000	Rs 50000	Rs 30000

#### Solution :

$$\begin{aligned}
 \text{PV of cash inflows} &= \text{PV of Rs 40000} + \text{PV of Rs 50000} + \text{PV of Rs 30000} \\
 &= [40000 \times 0.870] + [50000 \times 0.756] + [30000 \times 0.658] \\
 &= \text{Rs } 34800 + \text{Rs } 37800 + \text{Rs. } 19740 \\
 &= \text{Rs. } 92340
 \end{aligned}$$

In this example, the present value of cash inflows is Rs 92340, whereas, the cost of the project is Rs 1 lakh. As the benefits are less than the cost, the project is not acceptable.

**(b) Financing Decision :** When a company issues debentures, it receives cashflows now. Interest payments (cash outflows) are to be made at the end of each year. At the end of the period the debenture amount is redeemed. Therefore, the financing decision involves cash inflows first, followed by cash outflows

Time	$t_0$	$t_1$	$t_2 \dots \dots \dots t_n$
cash flows	Sale value of debentures	Interest	Interest and redemption value

As these cash flows takes place at different times, they cannot be compared. Time value of payment is taken into consideration by finding the discounted value (present value) of interest payments and redemption value. The present value of cash outflows is compared with sale value of debentures and Financing decision is taken whether to take up the issue of debentures.

### 1.10. Summary

This lesson has provided you an overview of Finance in a business entity. The scope, of financial management and finance function have been covered. The primary financial objectives of a company and the broad goal of a company have been discussed. Profit maximisation vis-a-vis wealth maximisation revealed that profit maximisation goal has certain limitations, which can be overcome with wealth maximisation goal.

The organisation of finance function and role of finance manager provide an insight into organisational chart and various functions of financial manager.

There are three major financial decisions, viz., Investment, Financing and Dividend decision. Investment decision relates to the selection of viable projects and estimating capital budget. Financing decision is concerned with the ways of finding funds to meet the capital budget requirement. Dividend decision is about how the earnings of the company are to be used i.e, a break up between dividends and retention.

Finally, the time value of money has been presented.

### 1.11. Key words

- Financial Management : Concerns the acquisition, financing, and management of assets with some overall goal.
- Future Value : The value at some future time of a present amount of money, or a series of payment, evaluated at a given interest rate.
- Net Present Value : The Present Value of an investment projects net cash flows minus the projects initial cash outflow.
- Present Value : The current value of a future amount of money, or a series of payments, evaluated at a given interest rate.
- Price / earning ratio (P / O) : The market price per share of a firm's common stock dividend by the most recent 12 months of earnings per share.
- Risk : The variability of returns from those that are expected.
- Capital structure : The mix of a firm's permanent long - term financing represented by debt, pefessed stock, and common stock equity.
- Compound Interest : Interest paid on any previous interest earned, as well as on the principal borrowed.



Funds	:	Funds include not only cash but also the total current assets or financial resources.
Profit Maximisation	:	It is a criterion for economic efficiency as profits provide a yard stick by which economic performances can be judged under condition of perfect competition.
Wealth Maximisation	:	It stands that the management should seek to maximise the present value of the expected returns of the firm.
Discounting	:	A reduction of some future amount of money to a present value at some appropriate rate in accordance with the concept of the time value of money.

### 1.12 Self - Assessment questions.

1. What do you mean by "Finance" ? Explain the scope of finance Function.
2. What is Financial Management ? What role a Financial Manager plays in a corporate enterprise ?
3. Do you think Wealth Maximisation, as a goal of a company, is superior to Profit Maximisation? Explain.
4. What are the major Financial Decision ? How do you trade off risk and return ?
5. How is Finance Function Organised ? What are the functions that finance officers perform in a large firm ?
6. What do you mean by Time Value of Money ? Explain its relevance in financial decision making.

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## LESSON - 2

**ENVIRONMENT OF FINANCE****OBJECTIVES**

The objectives of this lesson are to :

- P present various forms of business organisations and their features
- P discuss the tax system and various provisions of the Income Tax Act, 1961
- P explain various government regulations affecting the business enterprises
- P present the financial system consisting of financial assets, financial intermediaries, and financial markets.

**STRUCTURE :**

- 2.1. Introduction**
- 2.2. Forms of business organisation**
- 2.3. Tax system**
- 2.4. Government regulations**
- 2.5. Financial system**
  - 2.5.1. Financial assets**
  - 2.5.2. Financial intermediaries**
  - 2.5.3. Financial markets**
- 2.6. Summary**
- 2.7. Keywords**
- 2.7. Self Assessment questions**
- 2.8. Further Readings**

**2.1 Introduction**

The modern business enterprises have to operate in a fast changing and more competitive environment. Managers of these enterprises are required to possess the ability to react quickly and correctly to constantly changing market conditions. In this lesson, let us know about the environment of finance and government regulation.

**2.2. Forms of organisation**

There are four main forms of business organisation : (i) Sole Proprietorship (ii) Partnership firm (iii) Joint stock company, and iv) Cooperatives. In terms of numbers sole proprietary form of organisations rank first, but in terms of volume of business company form stand first. Each of these is briefly discussed in the following paragraphs.

### 2.2.1. Sole Proprietorship :

A sole proprietorship is a firm owned by an individual. He owns all assets and owes all liabilities of the business. These business organisations can be formed easily with few government regulations. When business is to run on small scale these forms of organisations are best suited.

The sole proprietorship form of organisations cannot raise large amounts of capital. The proprietor has unlimited liability. In this business form, if business debts could not be discharged with its assets, they must be discharged by personal assets. The business comes to an end if the proprietor ceases to exist. Limited resources, unlimited liability, lack of division of labour, lack of competitive edge, short life span, etc are the factors that keep these organisations backward.

### 2.2.2. Partnership Firm:

A partnership firm is a business unit carried on by two or more persons with an intention to share profits or losses. The major advantage is its low cost and easy formation. The limitations are similar to those associated with proprietorship: (1) unlimited liability (2) limited life (3) difficulty in transferring ownership and (4) limitations in raising funds.

The partners can potentially lose all of their personal assets. Each partner is liable for the business debts. Mutual conflicts, delay in decision making, low public confidence, disruption in continuity are some more negative features of partnership firms.

This form is suitable where the size of the business is small and capital requirement is low. It suits professions like medicine, accounting, legal, management, stock broking, etc.

### 2.2.3. Joint Stock Company:

A joint company is a legal entity created under the law and empowered to own assets, to incur liabilities, and to engage in business. It is an artificial person created by the law. The capital of a company is divided into small portions and each portion is called a "share". Investors who buy these shares are called shareholders and they are the owners of the company.

The liability of the shareholders is limited to the extent of share value. The shares of a public limited company are freely transferable and shares can be sold or bought. Important feature of company form of organisation is that ownership and management are in the hands of two different groups of people. The management of the company is vested in the hands of board of directors who are elected by the shareholders. A company runs for a long period, therefore has perpetual existence. Every company must be registered as per the provisions of Companies Act, 1956.

A person who makes efforts for bringing a company into being is called a promoter. Promotion is a process in which all factors of business are procured for the formation of a company. Promoters may be persons or institutions or a company. The company form of organisation emerges whenever large scale production or trading activity is taken up, requiring huge amounts of capital.

### 2.2.4. Co-operatives.

The philosophy behind cooperatives is "all for each and each for all." Cooperative societies are associations formed voluntarily by the people to render service to the members of their society. They are formed to protect and safeguard the economic interest of the weaker sections of the society from the exploitation of stronger sections of the society. Consumer cooperatives, producer cooperatives, marketing cooperatives, housing cooperatives, credit cooperatives, milk-producers cooperatives are some of the examples.

It is easy to form a cooperative society with simple legal formalities. Members have limited liability restricted to the extent of their share capital. Cooperatives offer services to their members. Supply of goods at cheaper reasonable rates, provision of credit facility at low rates of interest, construction of houses, distribution of seeds, fertilisers etc., are some of the services. Cooperatives enjoy perpetual existence.

However, cooperatives suffer from limited financial resources, lack of secrecy, competent management, rise of factionism and rivalries, domination of vested members, etc.

The choice of Form of organisation depends upon the following factors.

- P Nature of business.
- P Scale of operations.
- P Control
- P Risk and liability
- P Tax considerations
- P Financial requirement

### 2.3. Tax system :

By virtue of the implications of tax system, it has great relevance to finance function. Taxes are broadly classified as (i) direct taxes, and (ii) indirect taxes.

Direct taxes are directly paid by the person concerned, from his income or wealth. Income tax and wealth tax are direct taxes. Indirect taxes are paid indirectly because they are paid by one person but recovers the same from another person. Tax payer pays indirectly while purchasing goods, paying for services, etc. Central Excise (duty on manufacture) customs (duty on imports and exports); Sales tax, Octroi, Entry tax, Service tax, Expenditure tax are indirect taxes.

Various provision of Income Tax Act, 1961 which have a bearing on Financial Decisions are discussed here.

#### 2.3.1. Investment Decision :

Decisions related to various investment projects have to be taken by considering tax incentives available under the Income Tax Act apart from considering return, risk aspects of the project. Following tax incentives are available to companies on various projects.

- P Newly established undertakings in free trade zone, electronic software / hardware technology park or software technology park are eligible for a tax holiday for 10 years
- P Newly established 100 per cent Export oriented undertaking are eligible for tax holiday for 10 years.
- P New industrial undertakings established in North-Eastern Region are eligible for tax exemption for 10 years
- P Business establishments can claim depreciation on (i) tangible assets : buildings (10%), Machinery (25%) and furniture (15%) and (ii) intangible assets like technical know-how, patents, copy rights, trade marks, licenses, franchises (25%). In some cases a higher rate of depreciation is also allowed. For example, in case of buildings for installing water supply

or treatment system in the business of providing infrastructure facilities, depreciation is allowed at 100%. In the case of computers, 60%, energy saving devices 80%; pollution control equipment 100%; are the rates of depreciation.

- P Apart from normal depreciation, additional depreciation is also allowed at 15% of the actual cost of machinery.
- P In the case of profit from projects outside India (foreign projects) the least of the following limits is allowed as a deduction (a) 20% of profits. (b) Amount credited to foreign project Reserve Account (c) amount brought into India in convertible foreign exchange.
- P 50 per cent of profits from export of goods and merchandise are deductible
- P 50 per cent of profits from export of computer software are deductible
- P 50 percent of profits from films software are deductible
- P 100% of the profits from industrial undertaking engaged the infrastructure development, telecommunication service, industrial park, special economic zones, power generations, transmission and distribution are allowed as deduction for 10 years.
- P Profits from industrial undertaking which are not producing articles specified the Eleventh schedule like alcohol, cosmetic, tobacco products, chocolates, etc; hotels, industrial research institutes, minor oil etc are deductible.
- P In respect of certain undertakings in Himachal Pradesh, Sikkim, Uttaranchal and North - Eastern States tax holiday is available

Investment decisions must be taken by giving due weight to the incentives listed above. Make or buy decision, buying by instalments or to hire, own or lease decision are some of the investment decision which have tax implications. To buy an asset with borrowed funds or equity (own) funds is an important decision with tax implications. Tax savings resulting from the above incentives must be taken into account while evaluating a project.

**2.3. 2. Financing Decision :** Before commencing a new project a crucial decision regarding selecting right type of capital structure has to be taken. An optimum capital structure is one which maximises shareholders wealth. Capital structure decision has a long-term implications. It should take into account financial risk, cost of capital, control and tax considerations.

Under the present tax laws, dividend on shares is not deductible, while interest paid on borrowed capital is allowed as deduction. Cost of raising borrowed funds is deductible in one year while cost of raising equity funds is deductible over 5 years. Since, interest on debt is deductible, effective cost of debt is less than the actual cost of debt.

**For example :** If debentures are issued with a coupon rate of 16.5 per cent per annum and corporate tax rate is 35%. The after-tax cost of debentures will be  $16.5 \times (1 - 35\%) = 10.725$  per cent. Investments in debentures or equity shares issued by companies engaged in the business of infrastructures, power, telecommunication, industrial park, special economic zones equity shares are eligible for a tax rebate under the Income Tax Act. Such companies can tap the capital market easily as there is an incentive to the investor.

**2.3.3. Dividend Decision :** Dividend decisions are crucial as they involve certain tax implications. As per the law existing now, the following points deserve consideration.

- i) Dividends on shares from a domestic company are exempt in the hands of the shareholders.
- ii) Long term capital gains arising out of transfer of listed equity shares purchased between 1-3-2003 and 1-3-2004 are exempt from tax in the hands of the shareholders.
- iii) Domestic companies distributing dividends have to pay additional tax on distributed profits at a rate of 12.5 per cent (plus surcharge) in addition to normal tax.

## 2.4. Government Regulations

In India, a regulatory and monitoring framework is operated by the government and its agencies. Finance Manager has be familiar with these regulations.

### 2.4.1 Industrial Policy

Industrial policy refers to the policy of the government towards industries - their establishment functioning, growth and management. The policy indicates areas of large, medium and small scale sectors. It specifies the policy towards foreign capital, labour, tariff and the related aspects.

The following industrial policy resolutions were issued by the government since independence.

- (a) Industrial Policy, 1948
- (b) Industrial Policy, 1956
- (c) Industrial Policy, 1991

Industrial policy, 1991 was aimed at drastic changes in the industrial scenario in our country. There are many changes which deviate from the policy followed till 1991. The objectives of the policy are

- P Self - reliance to build on many sided gains already made
- P Encouragement to Indian entrepreneurship, promotion of productivity and employment generation.
- P Development of indigenou technology through greater investment in R & D and bringing in new technology to help Indian manufacturing units to attain world standards.
- P Removing the regulatory system and other weaknesses
- P Increasing the competitiveness of industries for the benefit of the common man.
- P Incentives for the industriaialisation of backward regions.
- P Enhanced support to the small-scale sector.
- P Ensure running of public sector undertakings (PSUs) on business lines and cut their losses.
- P Protect the interests of workers.
- P Abolish the monopoly of any sector in any field of manufacture except on strategic or security grounds.

- P To link the Indian economy to the global market so that we acquire the ability to pay for imports, and to make us less dependent on aid.

In the following areas the government has taken initiative to attain the above mentioned objectives.

- (a) Industrial Licensing
- (b) Foreign Investment
- (c) Foreign Technology agreements
- (d) M R T P Act.

**(a) Industrial licensing :**

P Industrial licensing is governed by the Industries (Development & Regulation) Act, 1951.

P Industrial licensing has been abolished for all industries except those specified.

P Specified industries are subject to compulsory licensing due to security, strategic, social, safety, environmental reasons. Manufacture of products of hazardous nature and articles of elitist consumption come under specified category.

P In case of projects where imported machinery or any capital goods are required, automatic clearance is given if foreign exchange availability is ensured through foreign equity and if the value of the imported capital goods required is less than 25 per cent of the total value of plant subject to a maximum of Rs 2 crores.

P In cities with population less than one million there is no requirement to get approval.

**(b) Foreign Investment :** In order to invite foreign investment in large private industries requiring huge investments and advanced technology, approval for foreign direct investment upto 51% foreign equity is provided.

**(c) Foreign Technology Agreements :** Automatic permission is given for foreign technology agreements in high priority industries upto a lump sum payment of Rs 1 crore, 5 percent royalty for domestic sales and 8 percent for exports, subject to total payment of 8 percent of sales over ten year period from the dates of agreement or seven years from the commencement of production

**(d) Monopolies and Restrictive Trade Practices Act (MRTP Act) 1999 :** To prevent concentration of economic power in the hands of few industrial houses and to check restrictive trade practices M R T P Act was promulgated. Majority of the restrictive provisions have been omitted after 1991 when reforms were introduced.

**2.4.2. Foreign Exchange Management Act, (FEMA) 1949**

FEMA aims at consolidating law relating to foreign exchange with the objective of facilitating external trade and payment and for promoting the orderly development and maintenance of foreign exchange markets in India.

FEMA is a regulation as well as a facilitator. It encourages Indian businesses to grow into strong Indian-based multinationals.

**Following are the important points relating to regulation and management of foreign exchange.**

- P Dealing Foreign Exchange :** No person shall deal in foreign exchange, make payment to person outside India, receive payment from person outside India and enter into any financial transaction for acquiring any asset outside India.
- P Holding of Foreign Exchange :** No person shall acquire, hold, possess or transfer any foreign exchange, foreign security, or any immovable property outside India.
- P Capital Account Transaction :** Any person may sell or draw foreign exchange to or from Reserve Bank of India.

**RBI may regulate :**

- issue of foreign security by person resident in India or out side India
- borrowing / lending in foreign exchange
- deposits
- transfers of immovable property outside India
- guarantees in respect of any debt
- P Export of goods of services :** Exporters shall furnish RBI, details of material and value of export. RBI ensures that export value is received without delay.
- P Realisation & Repatriator of Foreign Exchange :** Persons resident in India due to receive foreign exchange shall take necessary steps to realise and repatriate foreign exchange to India within the period specified by RBI.

**Automatic Route :** Automatic route is permitted for Indian enterprises subject to the fulfillment of the following conditions.

- P** Investment should not exceed \$ 50 millions in a block of 3 years in a joint venture abroad
- P** Must be making profits in three preceeding years.
- P** Investment must be in foreign entity engaged in core activity area. Financial services, information technology, entertainment software, pharmaceuticals, biotechnology are permitted in automatic route

Non-Resident investors investing in Indian companies are permitted to take automatic route.

- P** Non resident investors are not allowed in regulated sectors
- P** Investment should be by way of fresh issue of shares
- P** Foreign direct investment into e - commerce, power, petroleum refining, 22 specified consumer goods is permitted.

#### **2.4.3. The Securities And Exchange Board of India Act 1992**

The S E B I Act 1992 was promulgated after withdrawing the Capital Issues (Control) Act. S E B I is broad in its application covering wide ranging issues. The powers and functions of S E B I Act are:



- P Regulating the business of stock exchanges
- P Registering and regulating the working of
  - Stock brokers
  - Sub brokers
  - Share transfer agents
  - Bankers to the Issue
  - Trustees of Trust deeds
  - Registrars to an issue
  - Merchant Bankers
  - Under writers
  - Portfolio managers
  - Investment advisors
- P Registering and regulating the working of
  - depositories
  - custodians of securities
  - credit rating agencies
- P Registering and regulating the working of
  - venture capital fund,
  - Collective Investment Schemes
  - Mutual Funds.
- P Promoting self regulating organisations,
- P Prohibiting fraudulent and unfair trade practices
- P Promoting investors education
- P Prohibiting insider trading
- P Regulating substantial acquisition of shares, takeover of companies

#### 2.4.4. The Security Contracts (Regulation) Act, 1956

The objective of the Act is to prevent undesirable transactions in securities by regulating the business of dealing in securities.

- P Grant of Recognition to Stock Exchanges :** If the Central Government is satisfied that it would be in the interest of trade and also in the public interest to grant recognition to the stock exchange, it would grant subject to certain conditions.
- P Withdrawal of Recognition :** Central Government can withdraw recognition through a notification in the gazette after giving an opportunity of being heard.
- P Listing of securities :** A public company desirous of getting its securities listed shall apply along with

- Memorandum and Articles of Association
- Copy of the Trust Deed - in case of debenture issue
- Copies of all prospectuses issued by the company
- Copies of offer for sale, circulars, advertisements offering any securities during the last 5 years.
- Statement of dividends, bonus shares of last 10 years
- Certified copies of agreement between vendors and promoters, under writers, sub under writers, brokers, sub-brokers.
- certified copies of agreement with managing agents, selling agents, managing directors, technical directors, general manager, sales manager, secretary.
- brief history of the company
- particulars of shares and debentures
- list of highest 10 holders of each class of securities

At least 25 per cent of each class of securities should be offered to the public through advertisement in newspapers for two days.

#### 2.4.5. The Companies Act, 1956.

The companies Act, 1956, is a control measure used by the Government to regulate the functioning of the corporate sector in India. A company is an association of individuals united for some common purpose, permitted by law to use a common name to change its members without winding up the association. Following are some of the provisions of the Companies Act, 1956.

- P Registration** : To obtain the registration of a company, an application has to be filed with the Registrar of companies, along with (i) Memorandum of Association (ii) Articles of Association and (iii) list of directors.
- P Certificate of incorporation** : The certificate of incorporation brings the company into existence as a legal person. Upon its issue the company is born.
- P Commencement of business** : A private company can commence business right from the date of its incorporation. But in the case of public company, a further certificate for the commencement of business has to be obtained. This becomes necessary where a company has issued a prospectus inviting the public to subscribe for its shares.
- P Memorandum of Association** : It is a document of great importance in relation to the company. It contains the following fundamental clauses (i) Name clause (ii) Registered office clause (iii) Objects clause (iv) Liability clause (v) Capital clause.
- P Articles of Association** : This document contains rules, regulations and bye-laws for the general administration of the company.
- P Public Issue** : Company can raise capital from the general public by means of a public issue. A listed public company means a public company which has any of its securities listed in any

recognised stock exchange. A public company need not necessarily go to the public for money. The promoters may be confident of obtaining the required capital through private contracts. The process of issuing securities through a statement in lieu of prospectus is a kind of private placement.

- P Promoters** : Before a company can be formed there must be some persons who have the intention to form a company, and who take necessary steps to carry that intention into operation.
- P Shares** : Offers for shares are made on application forms supplied by the company. When an application is accepted, it is an allotment. A valid allotment has to comply with the requirements of the Act and principles of the law of contract relating to acceptance of offers.
- P Share Capital** : Capital must be divided into shares of a fixed amount. The Act permitted only two kinds of securities to be issued. (i) Equity shares (ii) Preference Shares. The Companies Amendment Act, 2000 has introduced some other categories of shares (1) Derivatives (2) Hybrid.
- P Directors** : Appointment - Removal - Powers - Duties - Remuneration
- P Meetings** : Statutory meeting (first meeting of the shareholders within six months from the date of commencement). Annual general meeting (one meeting of the shareholders each year) - extraordinary general meeting.
- P Dividends** : Board of directors should deposit the amount of dividend declared in a separate bank account within 5 days from the date of declaration.
- P Compulsory reserves** : The company shall transfer to the reserves certain percentage of profits not exceeding 10 per cent before any dividend is declared.
- P Accounts** : Books of Accounts - Accounting record, - preservation of account books - Right of inspection.
- P Auditors** : Appointment - Remuneration - Qualification - Removal - Power and Duties.

## 2.5. Financial System

The financial system consists of a variety of financial instruments or assets, financial intermediaries and financial markets. An understanding of the financial system is essential in financial decision making. A company raises resources through the issue of financial instruments in a financial market. Financial intermediaries facilitate the movement of funds from the investor to the user by providing various services.

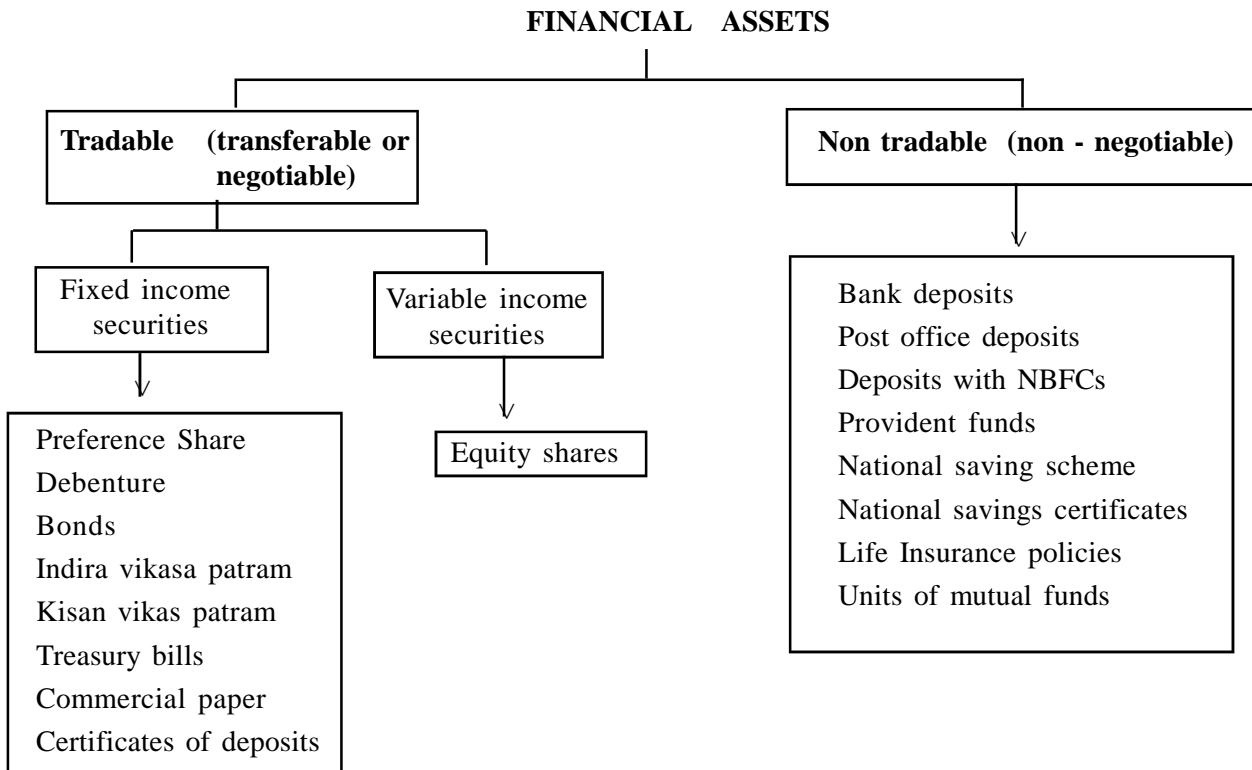
According to Robinson, “the primary function of the system is to provide a link between savings and investment for the creation of new wealth...”. The objective of the financial system is to supply funds to various sectors and activities of the economy.

### 2.5.1. Financial Assets :

Financial assets are the basic products of the financial system. Movement of funds from the suppliers of funds takes place when they are exchanged for a financial asset issued by the user of funds. If equity shares are issued by a company, equity share is a financial product, the sale of which facilitates the movement of funds.

Financial asset is a piece of paper evidencing a claim of the holder (investor) over the issuer (user). Currently financial assets are on de-mat form. They represent claim against the incomes and the assets of the issuing company.

#### Classification of Financial Assets :



These assets have different features with regard to the return (yield), risk (variability), liquidity, transferability, maturity, tax consideration, etc.

**Financial Derivatives** : Financial derivatives derive their value from underlying securities. They are financial contracts. In India stock exchanges have introduced index based derivatives to facilitate hedging of risk exposures and speculations with high leverage. Derivatives are short term in nature with less than a year to expiration issued by investors. Long term derivatives are issued by companies in the process of financing their activities. Options and futures are the examples for short term derivatives. Warrants and convertibles are the examples for long term derivatives.

#### 2.5.2. Financial Intermediaries

In a market for funds, the intermediaries bring users and suppliers of funds together. In India there are two types of financial intermediaries.

Intermediaries who collect funds from the suppliers and lend to the users are one type. These are called financial institutions or development banks. In a market where the expectations of the suppliers and expectations of the users do not coincide, exchange of funds do not take place. For example, a small investor in India looks for a short - term investment which can provide a reasonable rate of return without any risk and with easy liquidity. Whereas, companies require funds for a long term and risk is inherent in long-term investments. Under these circumstances, financial institutions emerged as an intermediary between supplier and user. The service provided by them is called financial intermediation. They help in

- \* Promoting savings of the economy
- \* Channelling funds to sectors where funds can be put to best and efficient use.
- \* Building investor confidence
- \* Diversification and minimisation of risk to the investor

### Financial Institutions

	Development Institutions
Commercial Banks	Industrial Finance Corporation of India
Cooperative credit societies	I C I C I
Post office savings Bank	I D B I
Provident Funds	I R B I
Pension Funds	Exim Bank
	NABARD
	Shipping Credit & Investment coparative of India
	(S C I C I)
	Tourism Finance Corporation of India

Second category of financial intermediaries are those agencies which facilitate the smooth and safe movement of funds from the supplier to the users. Under this categorie there are two types of agencies.

1. Regulatory Agencies	2. Financial Service Providers.
* Reserve Bank of India (R B I)	* Merchant bankers
* Securities & Exchange Board of India (SEBI)	* Underwriters
* Board for Industrial & Financial Reconstruction (B I F R)	* Credit rating agencies
* Foreign Exchange Management Act (FEMA)	* Brokers
	* Issue Managers

#### 2.5.3. Financial Markets

A financial market is a market where exchange of funds for financial instruments take place. They perform the following functions.

**P Price determination :** Like any other market, financial market facilitate in the determination of prices of financial instruments.

**P Provision of liquidity :** An investor who acquired financial instruments must be in a position to convert it into cash whenever he wants. Financial markets provide the mechanism through which liquidity is ensured.

**P Minimisation of transaction costs :** Market efficiency depends upon the availability of timely and accurate information. Transaction costs like, search cost, information cost, and middlemen brokerage can be minimised by financial markets.

There are different types of financial markets which are based on certain criteria

Criteria	Types	
1. Maturity Time	(a) Money market	(b) Capital market
2. Nature of instrument	(a) Equity market	(b) Debt market
3. Timing of delivery	(a) Spot market	(b) Future market
4. First or second hand	(a) Primary market	(b) Secondary market
5. Trading	(a) Exchange traded	(b) O T C market

- P Market for short term financial instruments is money market e.g. call money market, bill market.
- P Market for long-term financial instruments is capital market e.g : equity shares, debentures, preference shares.
- P Market for equity shares is equity market.
- P Market for all debt instruments or fixed financial claims whether short term or long term is debt market
- P A secondary market where immediate delivery of the instrument takes place after the transfer is effected is cash or spot market.
- P A secondary market where delivery occurs at a pre determined date in future, after the transfer is effected, is futures market.
- P Market where fresh claims are traded is the primary market. When the financial instruments are issued for the first time, it is primary market.
- P Market where already existing financial instruments are traded is secondary market. If a shareholders of X Y Z co. sells his shareholding to another person he is operating in a secondary market.
- P Market which is characterised by a centralised organisation with standard procedures is exchange traded market. Bombay stock exchange, National stock exchange are some of the examples.
- P A decentralised market with customised procedures is an over - the - counter (OTC) market.

## 2.6. Summary

Financial manager operating in a constantly changing environment should have the knowledge of the environment in which he is operating. The impact of the constituents of this environment on business decisions should be estimated before taking decisions.

Various forms of business organisation have different implications on business. Tax system, in existence in any economy, contains various provisions which are regulatory in nature. Certain provi-

sions provide various tax incentives, knowledge of which and decision making taking into consideration these incentives, would help in minimising tax burden.

Financial system consisting of financial instruments, financial intermediaries, and financial markets provide the mechanism for channelling funds to the industry. It is a set of complex, closely connected institutions, agents, practices, markets, transactions, claims, liabilities in the economy.

## 2.7. Keywords

## 2.8. Self Examination Questions

1. What are various forms of organisation ? Explain their salient features .
2. What are the tax provision that have a bearing on the investment decision ? Discuss.
3. Discuss the importance of Industrial policy, 1991 in the light of recent changes taking place in the Indian economy ?
4. Explain the main fectures of F E M A, 1999
5. “Companies Act 1956 regulates the functioning of the corporate sector in India” - Discuss.
6. What are the constituents of a financial system ?

## 2.9. Further Readings

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**LESSON - 3****CAPITAL BUDGETING - AN INTRODUCTION****CONCEPTS, CASH FLOWS****3.0 OBJECTIVES**

The main objectives of this lesson are to :

- 1) explain the nature and importance of capital budgeting decision.
- 2) discuss the types of capital budgeting decisions.
- 3) impart knowledge about the process of capital budgeting decisions.
- 4) enable you to estimate the cash flows of the investment projects.

**STRUCTURE**

- 3.1 : Introduction**
- 3.2 : Nature of Capital Budgeting**
- 3.3 : Significance of Capital Budgeting**
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**3.1 INTRODUCTION**

Financial decision making is viewed as an integral part of the overall management of a business concern. The financial manager has to make the financial decision within the framework of overall corporate objectives and policies. The overall development of a firm depends on market development, entry in new product line, termination of a product which is in declining stage, expansion of the plant, change of location, etc. In all



these issues, study of financial implications is inescapable. According to the modern approach, financial management is concerned with the solution of three major problems relating to the financial operations of the firm, viz., - investment, financing and dividend decisions.

Of these decisions, the investment decision relates to the selection of assets in which funds will be invested by a firm. The assets that can be acquired with these funds are broadly divided into.

Long-term assets and short term assets.

The decision regarding long-term assets which is known as capital budgeting. Whereas the financial decision with reference to investment on short-term assets is designated as working capital management. This lesson is devoted for capital budgeting its nature, process and cash flows and their computation. After studying this you will be also knowing the basic principles of estimating cashflows assuming certainly and also uncertainly as a last part of this lesson.

### 3.2 NATURE OF CAPITAL BUDGETING DECISION

Efficient allocation of capital is one of the most important functions of the financial management in modern times. This function involves the firm's decision to commit its funds in long-term assets and other profitable activities. The decision to invest funds in the long-term assets of a firm are quite significant and they will influence the firm's market value, growth and also affect the risk of a business.

**Weston and Brigham:** "Capital budgeting involves the process of planning expenditures whose returns are expected to extend beyond one year".

**Charles T. Horngren:** "Capital Budgeting is the long-term planning for making and financing proposed capital outlays".

**Robert N. Anthony:** "The Capital Budget is essentially a list of what management believes to be worthwhile projects for the acquisition of new capital assets together with the estimated cost of each project."

**James C. Van Horne:** "Capital Budgeting involves a current investment in which the benefits are expected to be received beyond one year in the future". It suggests that the investment in any asset with a life of less than a year falls into realm of working capital management, whereas any asset with a life of more than one year involves capital budgeting.

Thus, Capital Budgeting decision may be defined as "the firm's decision to invest its current funds most efficiently in long-term assets, in anticipation of an expected flow of benefits over a series of years".

According to these definitions one can draw the following features of a capital budgeting decision.

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

Generally, the capital budgeting or investment decisions includes addition, disposition, modification and replacement of fixed assets. The capital budgeting decision include, the following proposals:

- 1) **Expansion:** The company may have to expand its production capacities on account of high demand for its products or inadequate production capacity. This will need additional capital equipment.
- 2) **Diversification:** A company may intend to reduce its risk by operating in several activities. In such a case, capital investment may become necessary for purchase of new machinery and facilitates to handle the new products.
- 3) **Replacement:** The replacement of fixed assets in place of the existing assets, either being worn out or become out-dated on account of new technology.
- 4) **Research and Development:** Large sums of money may have to be spent for research and development, in case of those industries where technology is rapidly changing. In such cases, large sums of money are needed for research and development activities. So, these are also included in the proposals of capital budgeting.
- 5) **Miscellaneous Proposals:** A company 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 be necessary on account of legal requirements. Therefore, funds are required for such proposals also.

### 3.3 SIGNIFICANCE OF CAPITAL BUDGETING

Capital budgeting decisions are among the most crucial and critical decisions and they have significant impact on the future profitability of the firm. A special care should be taken while making capital budgeting decisions, because, it influences all the branches of a company such as production, marketing, personnel, etc. The other reasons for keeping more attention on capital budgeting decisions include the following:

- 1) **Long-Term Implications:** The effect of a capital budgeting decision will be felt over a long time period. It has an influence on the rate and direction of the growth of the company. The effects of capital budgeting decision extend into the future and have to be put up with for a longer period than the consequences of current operating expenditures.
- 2) **Investment of large funds:** Capital budgeting decision requires large amount of capital outlay. Hence, the company should carefully plan its capital budgeting programme, so that it may get the funds at the right time and they must be put to most profitable use. A wise investment can maximize the wealth of the company and an ill-advised and incorrect decision can jeopardise the profitable position and can also be the cause for the closure of the company.
- 3) **Irreversible Decisions:** The capital budgeting decisions are irreversible in majority of the cases. It is due to the fact that, it is very difficult to find a market for such capital terms once they have required. The only alternative is to treat the entire value of the asset as a scrap. This will result in heavy loss.
- 4) **Most difficult to make:** Capital budgeting decisions involve forecasting of future benefits which is almost uncertain. It is very difficult to project sales revenue, costs and benefits accurately in quantitative terms because of the influence of economic, political, social and technological factors. Further, the inaccurate forecast of asset needs can result in serious consequences on the company's performance.
- 5) **Raising of Funds:** There must be a perfect plan to raise the funds systematically. The company, planning for a major capital expenditure, needs to arrange finance in advance, to be sure of having the availability of funds.

- 6) **Ability to compete:** Finally, it has been said that, many firms fail not because of lack of capital equipment but because of lack of ability to compete. The conservative approach of having a small amount of capital equipment may be appropriate. But, some times it may be dangerous if the other competitors install modern and automated equipment that permit them to produce a better product and sell it at a lower price. Hence, the investment in capital assets must help the company to face and meet the competition from the other companies of the same industry.

### 3.4 TYPES OF CAPITAL BUDGETING

Capital budgeting projects may be classified as:

- 1) **Independent Projects:** Independent Projects are the projects which do not compete with one another. Based on the profitability of the projects and the availability of funds, a company undertakes any number of projects. In such a case, projects will be taken-up to a level where marginal cost of funds equals to marginal rate of return of the project.
- 2) **Mutually Exclusive Projects:** In case of mutually exclusive projects, acceptance of one project causes the rejection of another project. For example, if there are two projects - X and Y, either X or Y should be accepted by the company.
- 3) **Contingent Projects:** Acceptance of one project proposal depends on acceptance of one or more projects. A proposal for acquiring new machinery is dependent upon expansion of plant or replacement of old machinery or replacement of labour force.

### 3.5 CAPITAL BUDGETING PROCESS

The capital budgeting process involves generation of investment proposals, estimation of cash flows for the proposals, evaluation of cash flows, selection of projects based on acceptance criterion and finally the continual revaluation of investment after their acceptance. The steps involved in capital budgeting process are as follows:

- i) Project generation
- ii) Project evaluation
- iii) Project selection
- iv) Project execution

#### i) Project Generation

In the project generation stage, the company has to identify the proposals to be undertaken depending upon its future plan of activity. After identification of the proposals, they can be grouped according to the following categories:

- i. **Replacement of Equipment:** In this case, the existing old and out-dated equipment may be replaced by purchasing new and modern equipment.
- ii. **Expansion:** The company can go for increasing capacity in the existing product line by purchasing additional equipment.

- iii. **Diversification:** The company can diversify its product lines by way of producing various products and entering into different markets. For this purpose, it has to acquire the fixed assets to enable producing new products.
- iv. **Research and Development:** Where the company can go for installation of research and development wing by incurring heavy expenditure, with a view to innovate new methods of production, new products, new sources, new technology.

ii) **Project Evaluation:**

The process of project evaluation involves two steps:

- i. **Estimation of benefits and costs:** These must be measured in terms of cash flows. The benefits to be received are measured in terms of cash inflows, and costs to be incurred are measured in terms of cash outflows.
- ii. Selection of an appropriate criterion to judge the desirability of the project.

iii) **Project Selection:**

There is no standard administrative procedure for approving the investment decisions. The screening and selection procedure would be differ from firm to firm. Due to lot of importance of capital budgeting decision, the final approval of the project may generally rest on the top management of the company. However, the proposals are scrutinized at multiple levels. Sometimes, top management may delegate authority to approve certain types of investment proposals. The top management may do so by limiting the amount of cash outlay, prescribing the selection criteria and holding the lower management levels accountable for the results.

iv) **Project Execution:**

In the project execution, the top management or the Project Execution Committee is responsible for effective utilization of funds allocated for the projects. It must see that the funds are spent in accordance with the appropriation made in the capital budgeting plan. The funds for the purpose of the project execution must be spent only after obtaining the approval of the Finance Controller.

v) **Profit Review :**

After the execution, a continuous monitoring of the project is imperative so that expected and actual operating results compared. This helps in taking corrective action against the responsible people.

### 3.6 NEED FOR ESTIMATION OF CASH FLOWS

Capital expenditure decisions are of considerable significance due to their impact on the value of the firm. Thus, the future success and growth of the firm depends heavily on effectiveness of its capital budgeting decisions. To evaluate the effectiveness of the investment opportunities, one has to estimate the cash inflows and outflows of the project. The estimation of inflows and outflows of an investment decision is not a simple task, because, the benefits (inflows) from investments are received in some future period. The future is uncertain. The cost incurred and benefits received from the Capital Budgeting decisions recur in different time periods. These cash flows cannot be compared in straightaway manner, because of time value of money.

Hence, to evaluate the profitability of investment decision, cash inflows and outflows are to be calculated and compared by taking necessary care.

### 3.7 CASH FLOWS VS. ACCOUNTING PROFIT

As it is already pointed out, to evaluate any Capital investment proposal, it is necessary to estimate future benefits accruing from the investment proposal. Theoretically, two alternative criteria are available to quantify the future benefits: i) Accounting Profits and ii) Cash Flows. The difference between these two is mainly due to the presence of non-cash expenditure i.e. depreciation. Depreciation is non-cash expenditure, which does not involve any cash outflow. Where as the accounting profit is arrived at after deducting the amount of depreciation from the operating profits of the business, so that the amount of depreciation should be added to the profit after tax to know the actual cash inflow. The cash inflow approach of measuring future benefits of the project is superior to the accounting approach.

While considering the investment proposal, the firm is really interested in estimating its economic value. The economic value can be determined by the economic outflows and inflows related to investment project. The use of cash flows avoids accounting ambiguities. There are various ways to value inventory, allocate costs, calculate depreciation and amortisation of various expenses. Different net incomes will be arrived at under different accounting procedures. But, there is only one set of cash flows associated with the project. Further the cash flow approach considering the time value of money, whereas the accounting approach ignoring it.

Under usual accounting practice, revenue is recognized as being generated when the product is sold, but not when the cash is collected from the sale. Sales revenue may remain a paper figure for months or years before payment of the invoice is received. Expenditure is recognized as being made when incurred and not when the actual payment is made. Depreciation is deducted from the gross revenues to determine the earnings before-tax. Such procedure presents an accurate picture of the true benefits of a particular project. But, it ignores the increased flow of funds available for other use. Thus, accounting profits are quite useful for measuring performance, but less useful as decision criteria. The difference between the cash flow approach and the accounting profit approach is explained with the following example.

A comparison of Cash Flow (CFAT) and Accounting profit approaches

Item	Accounting Approach Rs.		Cash Flow Approach Rs. (CFAT)	
Net Revenues		10,00,000		10,00,000
Less: Expenses:				
Cash				
Non-cash (depreciation)	6,00,000		6,00,000	
	<u>1,50,000</u>	<u>7,50,000</u>		
Earnings before tax		2,50,000		
Less: Taxes @ 50%		<u>1,25,000</u>	<u>1,25,000</u>	<u>7,25,000</u>
Net earnings after taxes/ Cash flow		<u>1,25,000</u>		<u>2,75,000</u>

The difference between accounting profits (Rs.1,25,000) and cash flows (Rs.2,75,000) attributed to the depreciation charge is Rs.1,50,000. The cash available with the firm is Rs.2,75,000. This can be utilized for further investment. The accounting profit approach indicates that only Rs.1,25,000 is available. Hence, it gives only a partial picture of tangible benefits available. Therefore, in place of earnings, cash flows are used in evaluating capital expenditure alternatives.

### 3.8 COMPONENTS OF CASH FLOWS

For evaluating the profitability of investment opportunities, net capital outlays of the project are to be compared with the net cash inflows emerging from the project. Further, anticipated streams of cash benefits available during the lifetime of the project have to be computer into present value, so as to make them comparable with net capital outlay being incurred presently. Thus, the following are the components of an investment analysis.

1. Identifying net capital outlay
2. estimating streams of net cash inflows after taxes
3. computation of cash flows in terms of their time value

#### 1. Identification Net Cash outflows :

The total net cash outflows represents the net amount of capital expenditure in executing a capital project. The net capital outlay of a project includes the cost of purchasing land, building, plant and additional working capital required to carryout the investment proposals. If a project results in the replacement of an existing capital asset, its current book value is a sunk cost \*. However, its salvage value is deducted from the capital outlay of the new project in order to arrive at the net investment outlay.

Since payment of income tax results in cash expenditure, tax on profit on sale of an existing asset, in case of a replacement decision, is added to the capital outlay of the new project. Investment allowance, if any is deducted from the capital outlay for arriving at the net capital outlay.

#### 2. Estimation of Net Cash inflows : (CFAT)

Net cash inflows are the estimates of future streams of cash inflows resulting from the implementation of a project. These estimates are based on a number of factors. The forecasts relate to production, market share, sales revenues, profit margin, tax laws, state of the economy, etc. Cash inflows at different points of time have to be estimated on the basis of various forecasts. Though based on systematic forecasts and past experiences about the firm and industry, projections of future cash inflows based on these estimates are not absolute. Net cash inflows are estimates of cash revenues minus cash expenditures.

Since depreciation is a book adjustment and does not involve any cash outflows, it is not deducted from cash inflows for estimating the net cash inflows. But tax-benefit result from depreciation appropriation is included in cash inflows. The scrap value of an asset at the end of its operational life is another component of cash inflow. The removal expenses and capital gain taxes, if any, are deducted from the salvage value of the asset. Thus, net cash inflows are equal to cash revenues minus cash expenses plus tax benefit from depreciation appropriation plus salvage value of asset, net of removal expenses and capital gains tax plus value of current assets released.

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\* Sunk cost means the cost which cannot be recovered back.

### 3. Computation of Cash Flows in terms of their Time Value:

After determining the capital outlay of the project and economic gains which will be derived from the project, Finance manager's next task is to reduce them in present value. The present value of the capital outlay need not be calculated because it has to be incurred in the current year. But, in case of cash earnings which will be received over lifetime of the project, the question of finding out their present value arises. An understanding of the concept of present value is, therefore, imminent.

#### Present Value:

The concept of present value provides the underlying relationship between values of series of payments and revenues at different points of time. It is widely recognised that money has a time value. A rupee to be received a year from now is not worth as much today as a rupee to be received now. Atleast three factors contribute to the time value of money.

#### 3.9 COMPUTATION OF CASH FLOWS:

The data required for capital budgeting are about cash flows i.e. outflows and inflows. Their computation depends on the nature of the proposal. The capital projects can be categorised into:

- i. single Proposal
- ii. replacement projects
- iii. mutually exclusive projects

The computation of cash inflows and outflows with reference to these are explained in the following proposals.

##### i) Cash Flows: Single Proposal

The cash outflows required to carryout the proposed capital expenditure is depicted in the following format.

##### Format-1:

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Cash outflows of a new project (Beginning of the period at zero time,  $t = 0$ )

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Cost of new project (Land, Building, Plant, Machinery etc.)	X X X
+ Installation cost of plant and equipments	X X X
± Working Capital requirements	<u>X X X</u>
Net Cash Outflow	<u>X X X</u>

**Format-2:****Determination of Cash Inflows (CFAT) : Single Investment Proposal, (t = 1 to N years)**

Cash sales revenue	X X X
Less: Cash operating cost	<u>X X X</u>
Cash flows before depreciation and taxes (CFBT)	X X X
Less: Depreciation	<u>X X X</u>
Profit/Earnings Before Tax (PBT)	X X X
Less: Tax liability	<u>X X X</u>
Profit after tax (PAT)	X X X
Add: Depreciation	<u>X X X</u>
Cash flows after tax (CFAT)	X X X
Add: Salvage value (in 'n' th year)	X X X
Add: adjustment of working capital (in 'n' th year)	X X X

**Example-1:**

The marketing department of a firm estimates that 10,000 units of a product can be sold annually at a selling price of Rs.20/- per unit. The variable expenses are Rs.12/- per unit, towards, manufacturing and selling the product. It also involves a fixed cost of Rs.10,000 per annum.

A machine with a cost of Rs.1,00,000 and has an useful life of 10 years, be purchased to produce the product. The installation cost would amount to Rs.10,000 and additional working capital requirement is Rs.40,000. The firm uses straight line method of depreciation. The firm is in a tax bracket of 50%.

You are required to compute the relevant cash flows (out flows and inflows) associated with the acquisition of the machine, assuming that:

- a) there is no salvage value
- b) the salvage value is Rs.5000 for depreciation purpose
  - i) it is ignored
  - ii) it is considered

**Solution:**

Cash outflows at the beginning (t = 0)	Rs.
Cost of new machine	1,00,000
Add: installation charges	10,000
Add: additional working capital requirement	<u>40,000</u>
Total cash outflow	1,50,000

(a) cash inflow during life of Project (t = 1 to n years) No salvage value.



Year	Sales revenue	operating cost	Depreciation	Taxable Income (2-(3+4))	Taxes @ 50%	Earnings after taxes	Cash Flows After Tax (CFAT) (7+4)
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1	2	3	4	5	6	7	8
1-9	2,00,000	1,20,000	11,000	69,000	34,500	34,500	<u>45,500</u>
10	2,00,000	1,20,000	11,000	69,000	34,500	34,500	45,500
Add: Additional working capital recovery:							<u>40,000</u>
							85,500

(b) (i) (salvage value, but ignored for depreciation purpose)

1-9	2,00,000	1,20,000	11,000	69,000	34,500	34,500	<u>45,500</u>
10	2,00,000	1,20,000	11,000	69,000	34,500	34,500	45,500
Add: additional working Capital recovery :							<u>40,000</u>
Salvage Value			Rs.5000				85,500
Less: Tax on salvage value			- 2500				<u>2,500</u>
Represents profit			--				88,000

(b) (ii) salvage value considered for depreciation purpose.

1-9	2,00,000	1,20,000	10,500	69,500	34,750	34,750	<u>45,250</u>
10	2,00,000	1,20,000	10,500	69,500	34,750	34,750	45,250
Add: working capital recovery :							40,000
salvage value (no tax adjustment)							<u>5,000</u>
							<u>90,250</u>

i) Depreciation (Rs.1,00,000 + 10,000)  $\Rightarrow$  10 years = Rs.11,000

ii) Depreciation [(Rs.1,00,000+10,000) - 5000]  $\Rightarrow$  10 years = Rs.10,500

## ii) Cash Flows : Replacement Projects :

In case of replacement of an existing asset by a new one, the relevant cash outflows are incremental after tax cash flows. The sale proceeds of the existing asset reduce cash out flows required to purchase a new asset. To determine relevant cash outflows not only the cash proceeds of the existing assets but also their tax effects on cash flows must be taken into consideration. Tax effect on cashflows depends on the relationship between the sale proceeds, the initial purchase price and the present book value of an asset being replaced. There are four distinct possibilities.

- i) asset is sold for a price more than its initial purchase price.
- ii) asset is sold for a price more than its book value but less than its initial purchase price.
- iii) asset is sold for a price which is exactly equal to its book value.
- iv) asset is sold for a price less than its book value.

**Format-3:**

## Cash outflows in a replacement situation

Cost of new machine	X X X
Add: Installation charges	X X X
Add: Working Capital	<u>X X X</u>
	X X X
Less: Sale proceeds of the existing asset	X X X
Add/Less: Taxes paid/saved on sale of the asset	<u>X X X</u>
Net cash outflow	<u>X X X</u>

**Format-4:**

## Determination of Cash Flows After Tax (CFAT) in Replacement investment decision

	Year 1	2	3	4	5
Cash Inflow Before Tax (CFBT): (sales revenue - operating cost) proposed/new - existing / old surplus (deficiency)	-	-	-	-	-
Less: Taxes	-	-	-	-	-
a) Incremental CFAT	-	-	-	-	-
depreciation (proposed/new-existing/old) excess depreciation	-	-	-	-	-
b) tax savings on excess depreciation	-	-	-	-	-
(a+b) Incremental CFAT					
Add/Less: working capital recovery to be added in 'n' th year					

**Example-2:**

ABC Ltd., is currently using a machine which was purchased two years ago for Rs.1,40,000/- and has a remaining useful life of 5 years. The company is considering to replace the existing machine with a new one which will cost Rs.2,80,000. The installation cost will be Rs.20,000. The increase in working capital will be Rs.50,000. The expected cash inflows before depreciation and tax are as follows:

<u>Years</u>	<u>Existing Machine</u>	<u>New Machine</u>
1	60,000	1,00,000
2	60,000	1,20,000
3	60,000	1,50,000
4	60,000	2,00,000
5	60,000	2,20,000

The company uses straight-line method of depreciation. The average tax on income is 50% and the capital gain tax is 30%.

calculate incremental cash flows assuming sale value of existing machine.

i) Rs.1,60,000    ii) Rs.1,20,000    iii) Rs.1,00,000 and iv) Rs.60,000

**Solution:**

Incremental cash outflows at  $t = 0$

	(Rs.)			
	Different situations			
	(i) Rs.	(ii) Rs.	(iii) Rs.	(iv) Rs.
Cost of new machine	2,80,000	2,80,000	2,80,000	2,80,000
Add: Installation cost	20,000	20,000	20,000	20,000
Add: Working capital (additional)	<u>50,000</u>	<u>50,000</u>	<u>50,000</u>	<u>50,000</u>
	3,50,000	3,50,000	3,50,000	3,50,000
Less: Sale proceeds of the existing machine	<u>1,60,000</u>	<u>1,20,000</u>	<u>1,00,000</u>	<u>60,000</u>
	1,90,000	2,30,000	2,50,000	2,90,000
Add: Taxes paid/less taxes saved	<u>+ 26,000</u>	<u>+ 10,000</u>	-	<u>20,000</u>
Net cash outflow	2,16,000	2,40,000	2,50,000	2,70,000

Determination of tax liability/saved.

	(Rs.)			
	(i) Rs.	(ii) Rs.	(iii) Rs.	(iv) Rs.
Current book value of plant (Original cost Rs.1,40,000 - accumulated depreciation @ Rs.20,000 each year for 2 years)	1,00,000	1,00,000	1,00,000	1,00,000
Less: Sale value	<u>1,60,000</u>	<u>1,20,000</u>	<u>1,00,000</u>	<u>60,000</u>
Profit/Loss	60,000	20,000	-	20,000
Tax (payable on profits/savings or losses)	** 26,000	10,000	-	10,000

\*\* Capital gain Rs.20,000 (Rs.1,60,000 - Rs.1,40,000) and ordinary gain Rs.40,000 (Rs. 1,40,000 - Rs.1,00,000)

Taxes are (Rs.20,000 x 30%) + (40,000 x 50%) = Rs.26,000

Incremental cash Inflows After Taxes ( $t = 1-5$ )

Flow Years	1	2	3	4	5
Cash before taxes (CFBT)					
New Machine	1,00,000	1,20,000	1,50,000	2,00,000	2,20,000
Old Machine	<u>60,000</u>	<u>60,000</u>	<u>60,000</u>	<u>60,000</u>	<u>60,000</u>
	40,000	60,000	90,000	1,40,000	1,60,000
Less tax @ 50%	<u>20,000</u>	<u>30,000</u>	<u>45,000</u>	<u>70,000</u>	<u>80,000</u>
(a) Incremental CFAT	<u>20,000</u>	<u>30,000</u>	<u>45,000</u>	<u>70,000</u>	<u>80,000</u>

Depreciation:					
New machine (Rs.3,00,000 + 5 years)	60,000	60,000	60,000	60,000	60,000
Old machine	<u>20,000</u>	<u>20,000</u>	<u>20,000</u>	<u>20,000</u>	<u>20,000</u>
Excess depreciation	40,000	40,000	40,000	40,000	40,000
(b) Tax saving on excess depreciation	<u>20,000</u>	<u>20,000</u>	<u>20,000</u>	<u>20,000</u>	<u>20,000</u>
Incremental Cash Flows after Tax (a+b)	40,000	50,000	65,000	90,000	1,00,000
Add: working capital recovery					<u>50,000</u>
					1,50,000

**ALTERNATIVELY**

## Incremental Cash Inflows After Taxes (t = 1-5)

(Rs.)

Years					
Incremental Cash Flow Before Tax (New-Old)	40,000	60,000	90,000	1,40,000	1,60,000
Less: Excess depreciation	<u>40,000</u>	<u>40,000</u>	<u>40,000</u>	<u>40,000</u>	<u>40,000</u>
Taxable income (incremental)	-	20,000	50,000	1,00,000	1,20,000
Less: Tax @ 50%	-	<u>10,000</u>	<u>25,000</u>	<u>50,000</u>	<u>60,000</u>
Earnings after tax (incremental)	-	10,000	25,000	50,000	60,000
Add: Excess depreciation	<u>40,000</u>	<u>40,000</u>	<u>40,000</u>	<u>40,000</u>	<u>40,000</u>
Cash Flow After Tax (incremental)	40,000	50,000	65,000	90,000	1,00,000
Add: recovery of working capital					<u>50,000</u>
					1,50,000

**iii) Cash Flows : Mutually Exclusive projects :**

Mutually exclusive projects are the Projects which compete with one another. Acceptance of one will cause the rejection of other projects. Alternatives are mutually exclusive and only one may be chosen. The best alternative automatically eliminates the other alternatives.

**Example:**

The ABC Ltd., has under consideration two mutually exclusive proposals with the following information:

	Alpha	Beta
Net cash outlay (t = 0)	Rs.4,00,000	Rs.3,00,000
Net cash savings in operating expenses Before depreciation and taxes		
Year 1	1,00,000	72,000
Year 2	1,20,000	80,000
Year 3	1,40,000	88,000
Year 4	1,00,000	80,000
Year 5	80,000	64,000

You are required to calculate cashflows assuming that the firm is following straight line method of depreciation and its tax rate is 50% and the asset has no salvage value.

Relevant cash flows, mutually exclusive projects

- a) Cash outflow of Proposal Alpha Rs.4,00,000                      b) Beta Rs.3,00,000

Estimation of CFAT of Mutually Exchange Projects

Year	Savings in operating Expenses (Rs.)	Depreciation (Rs.)	PBT (Rs.)	Tax @ 50% (Rs.)	PAT (Rs.)	CFAT (Rs.)
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a) Cash flow of Proposal Alpha:

1	1,00,000	80,000	20,000	10,000	10,000	90,000
2	1,20,000	80,000	40,000	20,000	20,000	1,00,000
3	1,40,000	80,000	60,000	30,000	30,000	1,10,000
4	1,00,000	80,000	20,000	10,000	10,000	90,000
5	80,000	80,000	-	-	-	80,000

b) Cash flow of Proposal Beta:

1	72,000	60,000	12,000	6,000	6,000	66,000
2	80,000	60,000	20,000	10,000	10,000	70,000
3	88,000	60,000	28,000	14,000	14,000	70,000
4	80,000	60,000	20,000	10,000	10,000	70,000
5	64,000	60,000	4,000	2,000	2,000	62,000

### 3.11 SUMMARY:

The ultimate objective of the financial management is to maximise the satisfaction of all stakeholders in general and wealth of shareholders in particular. To achieve these objectives the firm has to allocate its resources in an effective manner. Allocation of current funds with an anticipation of future returns may be known as Capital Budgeting. Capital Budgeting decision is one of the most important decisions of a business concern. It involves the estimation of cash outflows and inflows of a project. It has an impact over the future profitability and survival of the firm. Moreover, they are irreversible and may be difficult.

### 3.12 KEY WORDS

Capital Budget : It is the firm's formal plan for the investment of long-term funds in purchase of fixed assets.

Accept-Reject criterion : Evaluation of Capital Budgeting proposals to determine whether the project under consideration satisfies the minimum acceptance standard and should be accepted.

- Capital Budgeting: The process of generating, evaluating, selecting and following up on capital expenditure projects. The methods employed to evaluate the worth of the capital expenditure proposals are known as Capital Budgeting techniques.
- Cash Outflows / Outlay : Investment to be made for acquiring an asset from which benefits would be available beyond one year.
- Cash Inflows : Expected benefits over a project during its life time.

### 3.13 SELF ASSESSMENT QUESTIONS:

1. Define the concept of Capital Budgeting and explain its significance.
2. What do you mean by Capital Budgeting Process? Explain the various steps in this process.
3. Differentiate between Cash flow and Accounting Profit.
4. Discuss the various components of Cash flows.
5. Describe the procedure of computation of Cash flows.

### 3.14 FURTHER READINGS :

- Khan & Jain : Financial Management, Tata McGraw Hill Co., New Delhi
- Pondey, IM : Financial Management, Vikas Publications, New Delhi
- Hampton : Financial Decision Making, Prentice Hall of India, New Delhi

## LESSON - 4

# CAPITAL BUDGETING: UNDER CERTAINTY

### 4.0 OBJECTIVES :

The objectives of this lesson are to :

- 1) make the students familiar about investment criterion.
- 2) impart knowledge about various techniques for appraisal of investment decisions..
- 3) make realise the importance of time value of money.
- 4) inculcate the skill of choosing projects under capital rationing.

### STRUCTURE

- 4.1 Introduction.
- 4.2 Investment criterion. - Methods of appraisal.
- 4.3 Traditional Methods.
  - 4.3.1. Pay - back period
  - 4.3.2. Accounting Rate of return
- 4.4 Discounted Cash Flow Techniques.
  - 4.4.1 Net present value
  - 4.4.2 Internal Rate of Return
  - 4.4.3 Profitability Index
- 4.5 Net Present Value Vs. Profitability Index
- 4.6 Net present Value Vs. Internal Rate of Return
  - 4.6.1 Equivalence and difference
  - 4.6.2 Ranking Independent and Dependent Projects
  - 4.6.3 Non-conventional investments
  - 4.6.4 NPV and IRR choice of the method.
- 4.7 Capital Rationing
- 4.8 Summary
- 4.9 Key words
- 4.10 Self assessment Questions.
- 4.11 Further readings.

#### 4.1. INTRODUCTION:

In the previous lesson you have studied about the nature, meaning and importance of capital budgeting. It is also explained about the types and process of capital budgeting decision making. The estimation of cash flows which is a pre requisite for evaluating the projects was also explained. This lesson is devoted to explain the methods of capital budgeting both traditional and discounted cash flow techniques with merits, demerits and their applicability. At the end the concept of capital rating also discussed.

#### 4.2 INVESTMENT CRITERION - METHODS OF APPRAISAL

The capital budgeting appraisal methods or techniques for evaluation of investment proposals will help the company to decide the desirability of an investment proposal, depending upon their relative income generating capacity and rank them in order of their desirability. These methods provide the company a set of norms on the basis of which, either it has to accept or reject the investment proposal. Therefore, a sound appraisal method should enable the company to measure the real worth of the investment proposal. The appraisal methods should possess several good characteristics, which are mentioned as under.

##### Characteristics of a Sound Appraisal Method

- i). It should help the company to rank the investment proposals in order of their desirability.
- ii). It should provide a technique for distinguishing between an acceptable and non-acceptable project.
- iii). It should provide a criteria to solve the problem of choosing among alternative projects.
- iv). It should recognise the importance of time value of money i.e., bigger benefits are preferable to smaller ones and early benefits are preferable to later benefits.
- v). It should provide the criteria for the selection of investment proposals.
- vi). It should take into account the pattern of cash flows.

The criteria for the appraisal of investment proposals are grouped into two types :

##### A. Traditional methods

- i) Pay Back Period Method
- ii) Accounting or Average Rate of Return (ARR)

##### B. Time-adjusted or discounted cash flow Techniques

- i) Net Present Value (NPV)
- ii) Internal Rate of Return (IRR)
- iii) Profitability Index (PI)
- iv) Discounted payback method

#### 4.3 TRADITIONAL METHODS :

These methods are based on the principles to determine the desirability of an investment project on the basis of its useful life and expected returns. These methods depend upon the accounting information



available from the books of accounts of the company. These will not take into account the concept of 'time value of money' which is a significant factor to determine the desirability of a project in terms of present value.

#### 4.3.1 Pay-back Period :

It is the most popular and widely recognised traditional method of evaluating the investment proposals. It can be defined as "the number of years required to recover the original capital invested in a project". According to Weston and Brigham, "the pay back period is the number of years it takes for the firm to recover its original investment by net returns before depreciation, but after taxes". It can be calculated with the help of the following formula :

$$\text{Pay back period} = \frac{\text{Cash outlay}}{\text{Annual cash inflows}}$$

The pay back period can be used as an accept or reject criterion as well as a method of ranking projects. The pay back period is the number of years to recover the investment made in a project. If the pay back period calculated for a project is less than the maximum pay back period set - up by the company, it can be accepted. As a ranking method it gives the highest rank to a project which has the lowest pay back period, and the lowest rank to a project with the highest pay back period. Whenever a company faces the problem of choosing among two or more mutually exclusive projects, it can select a project on the basis of pay back period, which has shorter period than the other project.

**Merits :** The following are the merits of the pay back period method.

- i. **Easy to calculate :** It is one of the easiest methods of evaluating the investment projects. It is simple to understand and easy to compute.
- ii. **Knowledge :** The knowledge of pay back period is useful in decision-making, the shorter the period better the project.
- iii. **Protection from loss due to obsolescence:** This method is very suitable to such industries where mechanical and technical changes are routine practice and hence, shorter pay back period practice avoid such losses.
- iv. **Easily availability of information :** It can be computed on the basis of accounting information, what is available from the books.

**Demerits:** However, the pay back period has certain demerits:

- i). **Failure in taking cash flows after payback period :** This methods is not taking into account the cashflows received by the company after the pay back period;
- ii). **Not considering time the value of money:** It does not take into account the time value of money;
- iii). **Non-consideration of interest factor:** It does not take into account the interest factor involved in the capital outlay.

iv). **Maximisation of market value not possible:** It is not consistent with the objective of maximising the market value of the share;

v). **Failure in taking magnitude and timing of cash inflows:** It fails to consider the pattern of cash inflows i.e., the magnitude and timing of cash inflows.

a) **When cash flows are uniform :** If the proposed project's cash inflows are uniform the following formula can be used to calculate the pay back period.

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

**Example 1** A project requires an initial investment of Rs.1,00,000/- with an useful life of 5 years. The projected cash inflows after tax (CFAT) are as follows.

Year	1	2	3	4	5
CFAT	Rs.40,000	Rs.40,000	Rs.40,000	Rs.40,000	Rs.40,000

Calculate pay back period.

**Solution:-**

Since the cashflows of the project are uniform for all the years payback period may be computed by using the following formula.

$$\text{Pay back period} = \frac{\text{Initial Investment}}{\text{Annual cashflow}} = \frac{\text{Rs. 1,00,000}}{\text{Rs. 40,000}} = 2.5 \text{ years}$$

**Note :** Pay back period is always expressed in years.

**When cashflows are not uniform.**

In the previous example, it is assumed that the cash inflows are uniform. But, in practice inflows may change from year to year. In such a case, pay back period can be computed by cumulating the annual cashflows.

**Example : 2** A machine costs Rs.4,00,000 and is expected to generate the following cash flows during its lifetime.

Compute the pay back period.

Year	1	2	3	4	5	6	7	8	9	10
CFAT (Rs.)	60,000	80,000	40,000	1,00,000	1,10,000	80,000	60,000	1,50,000	1,40,000	1,80,000



**Solution:**

Given the cashflows are not uniform we have to calculate cumulative cashflows.

Year	CFAT(Rs)	Cumulative CFAT (Rs.)
1	60,000	60,000
2	80,000	1,40,000
3	40,000	1,80,000
4	1,00,000	2,80,000
5	1,10,000	3,90,000
6	80,000	4,70,000
7	60,000	5,30,000
8	1,50,000	6,80,000
9	1,40,000	8,20,000
10	1,80,000	10,00,000

$$\text{Pay back period} = \text{Base year} + \frac{\text{Required CFAT}}{\text{Next year CFAT}}$$

$$\text{Pay back period} = \text{Base 5 years} + \frac{\text{Rs. 10,000}}{\text{Rs. 80,000}} = 5.125 \text{ years (5 years 1 month 15 day)}$$

**Example :** Dugar Ltd., is producing articles by manual labour and is considering to replace it by a machine. There are two alternative models 'M' and 'N' of the machine. Prepare a statement of profitability showing the pay-back period from the following information:

	Machine M Rs.	Machine N Rs.
Estimated life of the machine	4 years	5 years
Cost of the machine	9,000	18,000
Estimated savings in scrap	500	800
Estimated savings in direct wages	6,000	8,000
Additional cost of maintenance	800	1,000
Additional cost of supervision (ignore taxation)	1,200	1,800

**Solution:** Statement showing annual cash inlows

	Machine M	Machine N
	Rs.	Rs.
Estimated savings in scrap	500	800
Estimated savings in direct wages	6,000	8,000
Total savings (A)	6,500	8,800
Additional cost of maintenance	800	1,000
Additional cost of supervision	1,200	1,800
Total additional costs (B)	2,000	2,800
Net cashinflow (A-B)	4,500	6,000

$$\text{Pay back period} = \frac{\text{Original Investment}}{\text{Average Annual cashflows}}$$

$$\text{Machine M} = \frac{\text{Rs. 9,000}}{\text{Rs. 4,500}} = 2 \text{ years}$$

$$\text{Machine N} = \frac{\text{Rs. 18,000}}{\text{Rs. 6,000}} = 3 \text{ years}$$

Machine 'M' has a shorter pay-back period hence it should be preferred to Machine N.

#### 4.3.2 Accounting or Average Rate of Return (ARR) :

This technique uses the accounting information revealed by the financial statements to measure the profitability of an investment proposal. It can be determined by dividing the average income after taxes by the average investment. According to Soloman, accounting rate of return can be calculated as the ratio, of average net income to the initial investment.

On the basis of this method, the company can select all those projects whose ARR is higher than the minimum rate established by the company. It can reject the projects with an ARR lower than the expected rate of return. This method also helps the management to rank the proposals on the basis of ARR.

$$\text{Accounting Rate of Return (ARR)} = \frac{\text{Average Net Income}}{\text{Average Investment}}$$

**Merits:** The following are the merits of ARR method:

1. It is very simple to understand and calculate;
2. It can be readily computed with the help of the available accounting data;
3. It uses the entire stream of earnings to calculate the ARR.

**Demerits:** This method has the following demerits:

1. It is not based on cashflows generated by a project;
2. This method does not consider the objective of wealth maximisation;
3. It ignores the length of the projects useful life;
4. It does not take into account the fact that the profits can be re-invested; and
5. It ignores the time value of money.

**Example 4 :** A Machine costs Rs.10,00,000 has a 5 years life and no scrap. It is depreciated on straight line basis. The expected net earnings after depreciation and taxes are as follows.

Year	1	2	3	4	5
Net Earning after Taxes (in Rs.)	1,00,000	1,50,000	2,00,000	1,80,000	1,70,000

Calculate accounting rate of return.

**Solution:-**

Average earnings after taxes

$$= \frac{\text{Rs. } 1,00,000 + \text{Rs. } 1,50,000 + \text{Rs. } 2,00,000 + \text{Rs. } 1,80,000 + \text{Rs. } 1,70,000}{5}$$

$$= \frac{\text{Rs. } 8,00,000}{5} = \text{Rs. } 1,60,000$$

$$\text{Average Investment} = \frac{\text{Rs. } 10,00,000}{2} = \text{Rs. } 5,00,000$$

$$\text{Accounting Rate of Return (ARR)} = \frac{\text{Rs. } 1,60,000}{\text{Rs. } 5,00,000} \times 100 = 32\%$$

$$\text{ARR can also be calculated on total investment} = \frac{\text{Rs. } 1,60,000}{\text{Rs. } 10,00,000} \times 100 = 16\%$$

**Example 5 :** Determine the Average Rate of Return from the following data of two Machines A and B.

	Machine A (Rs)	Machine B (Rs)
Original cost	60,000	60,000
required Net working capital	5,000	6,000
Estimated Salvage Value	3,000	3,000

**Annual Estimated Income after Depreciation and Taxes:**

Year 1	4,000	12,000
Year 2	6,000	9,000
Year 3	8,000	8,000
Year 4	9,000	6,000
Year 5	12,000	4,000
TOTAL :	39,000	39,000



Estimated life in years	5	5
Income tax rate	50%	50%

Depreciation has been charged on Straight line method.

**Solution:**

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

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

$$\text{Machine A} = \frac{\text{Rs. } 39,000}{5} = 7,800$$

$$\text{Machine B} = \frac{\text{Rs. } 39,000}{5} = \text{Rs. } 7,800$$

$$\text{Average Investment} = \frac{\text{Original Investment} - \text{Scrap Value}}{2} + (\text{working capital require})$$

$$\text{Machine A} = \frac{\text{Rs. } 60,000 - \text{Rs. } 3,000}{2} + (\text{Rs. } 5,000 + \text{Rs. } 3,000) = \text{Rs. } 36,500$$

$$\text{Machine B} = \frac{\text{Rs. } 60,000 - \text{Rs. } 3,000}{2} + (\text{Rs. } 6,000 + \text{Rs. } 3,000) = \text{Rs. } 37,500$$

$$ARR \text{ for Machine A} = \frac{\text{Rs. } 7,800}{36,500} \times 100 = 21.37\%$$

$$ARR \text{ for Machine B} = \frac{\text{Rs. } 7,800}{37,500} \times 100 = 20.8\%$$

**Machine A is preferable, because its ARR is higher than machine B.**

#### 4.4 DISCOUNTED CASH FLOW TECHNIQUES:

The discounted cash flow methods provide a more objective basis for evaluating and selecting an investment project. These methods consider the magnitude and timing of cashflows in each period of a project's life. Discounted cashflow methods enable us to isolate the differences in the timing of cashflows of the project by discounting them to know the present value. The present value can be analysed to determine the desirability of the project. These techniques adjust the cashflows over the life of a project for the time value of money. The popular discounted cashflow techniques are:

- Net present value
- Internal rate of return, and
- Profitability index

### Time Value of Money.

The value of money received today is more than the value of money received after some time in the future. due to the following reasons :

- i) **Inflation:** Under inflationary conditions the value of money expressed in terms of its purchasing power over goods and services declines.
- ii) **Risk:** Having one rupee now is certain, where as one rupee receivable tomorrow is less certain. That is a bird-in-the-hand principle is most important in the investment decisions.
- iii) **Personal consumption preference :** Many individuals have a strong preference for immediate rather than delayed consumption. The promise of a bowl of rice next week counts for little to the starving man.
- iv) **Investment opportunities:** Money like any other commodity has a price. Given the choice of Rs.1000/- now or the same amount in one year time, it is always preferable to take Rs.1000/- now. because it could be invested over the next year @ 12% interest, to produce Rs.1,120/- at the end of year. If the risk-free rate of return is 12%, then you would be indifferent in receiving Rs.1000/- now or Rs.1120 in one year's time. In other words, the present value of Rs.1120/- receivable one year hence is Rs.1000/

### 4.5 Present value:

The value of a firm depends upon the net cash inflows generated by the firm assets and also on future returns. The amount of cash inflows and the risk associated with the uncertainty of future returns forms the basis of valuation. To get the present value, cash inflows are to be discounted at the required rate of return i.e., minimum rate expected by the investor to account for their timing and risk. The cash inflows and outflows of an investment decision are to be compared at zero time period or at the same value by discounting them at required rate of return. The following formula can be used to discount the future inflows of a project to compare with its cash outflows.

$$V_0 = \frac{C_1}{(1+K)^1} + \frac{C_2}{(1+K)^2} + \frac{C_3}{(1+K)^3} + \dots + \frac{C_n}{(1+K)^n}$$

$$V_0 = \sum_{t=1}^n \frac{C_t}{(1+k)^t}$$

Where  $V_0$  = present value of cash inflows of the project during its life time.

$C_1, C_2, \dots, C_n$  = Expected cash inflows of the project during its life time.

$K$  = Discount rate.

$n$  = Expected life of the project.

For example, if the annual cash inflows expected to be generated by an investment project for the next 10 years is Rs. 25,000 per annum and the rate of discount is 15%. Then the present value of the asset is :

$$V_0 = \sum_{t=1}^{10} \frac{Rs.25,000}{(1+.15)^t}$$



Using the present value of annuity table corresponding to 15% the discount rate for 10 years period the annuity factor is 5.0119.

Present value = Annual cash inflows x Annuity factor for 10 years @ 15%

So the present value is (Rs. 25,000 x 5.0119) Rs. 1,25,475/-

### Example : 6

The present value of the cash flows of two machines A and B of example - 5 is calculated as :

Year	Machine A			Machine B		
	CFAT (Rs).	P.V. Factor at 10%	Present Value (Rs.)	CFAT (Rs).	P.V. Factor 0.10%	Present value (Rs).
1	4,000	0.909	3636	12,000	0.909	10908
2	6,000	0.826	4956	9,000	0.826	7434
3	8,000	0.751	6008	8,000	0.751	6008
4	9,000	0.683	6,147	6,000	0.683	4098
5	12,000	0.621	7,452	4,000	0.621	2,484
<b>Total</b>	<b>39,000</b>		<b>28,199</b>	<b>39,000</b>		<b>30,932</b>

Even though the total cashflow after tax (CFAT) for both machines, A and B are the same i.e. Rs. 39,000 but the present value of CFAT is different because of converting CFAT into their present value. The present value of CFAT of machine B is Rs. 30,932 which is greater than the present value of CFAT of machine A i.e., Rs. 28,199. If the investment for both the machines, A and B is same Rs. 25,000 at zero time period investment over machine 'B' is more profitable.

#### 4.4.1 Net present value (NPV) :

The net present value method is a classic method of evaluating the investment proposals. It is one of the methods of discounted cash flow techniques. Which recognises the importance of time value of money. It correctly postulates that cash flows arising at different time periods differ in value and are comparable only with their equivalents i.e., present values are found out.

It is a method of calculating the present value of cash flows (inflows and outflows) of an investment proposal using the cost of capital as an appropriate discounting rate. The net present value will be arrived at by subtracting the present value of cash outflows from the present value of cash inflows. According to Ezra Solomon, "it is a present value of the cost of the investment."

#### Steps to compute net present value :

- i. An appropriate rate of interest should be selected to discount the cash flows. Generally, this will be the "cost of capital" of the company, or required rate of return.
- ii. The present value of inflows and outflows of an investment proposal has to be computed by discounting them with an appropriate cost of capital.
- iii. The net present value is the difference between the present value of cash inflows and the present value of cash outflows.



The formula for the net present value can be written as :

$$NPV = \left[ \frac{C_1}{(1+K)^1} + \frac{C_2}{(1+K)^2} + \frac{C_3}{(1+K)^3} + \dots + \frac{C_n}{(1+K)^n} \right] - C_0$$

Thus, the net present value is the difference between the present value of the future cash inflows after tax and the present value of cash outlays. Symbolically the NPV can be expressed as :

$$NPV = \sum PVAs - \sum C_0$$

Where  $\sum PVAs$  = Total present values of cash inflows.

$\sum C_0$  = Total present value of cash outlays.

The present values of capital outlays and cash inflows are to be calculated using Present Value Tables given at the end of the book. The decision criteria for accepting or rejecting a project as given here is :

<b>NPV &gt; Zero</b>	Accept
<b>NPV &lt; Zero</b>	Reject
<b>NP = 0</b>	may accept or reject

In other words, if the **NPV** is positive, (i.e., the present value of cash inflows is greater than the present value of cash outflows) the project should be accepted, otherwise rejected. The accept/reject criterion under the **NPV** method can also be put as :

<b>PV &gt; C<sub>0</sub></b>	Accept
<b>PV &lt; C<sub>0</sub></b>	Reject
<b>PV = C<sub>0</sub></b>	may accept or reject

Where,

**PV** = Total present values of cash inflows

**C<sub>0</sub>** = Total present value of cash outlays.

Zero NPV implies a situation where the firm can only recover the original investment.

Thus, under NPV technique, a project will be selected whose net present value is positive or above zero. If a project's NPV is less than "zero", it gives negative NPV, hence it must be rejected. The ranking of the proposals can be made by way of assigning ranks on the magnitude of positive net present value.

**Merits:** The following are the merits of the net present value (NPV) method:

- (i) **Consideration to total Cash Inflows:** The NPV method considers the total cash inflows of investment opportunities over the entire life-time of the projects unlike the payback period method.

- (ii) **Recognition to the Time Value of Money:** This method explicitly recognises the time value of money, which is inevitable for making meaningful financial decisions.
- (iii) **Changing Discount Rate:** Since discounting rate changes due to time variations in cash inflows a changing discount rate can be used for the NPV calculations by altering the denominator.
- (iv) **Best decision criteria for Mutually Exclusive Projects:** This method is particularly useful for the selection of mutually exclusive projects. It serves as the best decision criteria for mutually exclusive choice proposals.
- (v) **Maximisation of the Shareholders Wealth :** finally, the NPV method is instrumental in achieving the objective of the maximisation of the shareholders' wealth. This method is logically consistent with the company's objective of maximising shareholders' wealth in terms of maximising market value of shares, and theoretically correct for the selection of investment proposals.

**Demerits:** The following are the demerits of the net present value method:

1. It is difficult to understand and use.
2. The NPV is calculated by using the cost of capital as a discount rate. But the concept of cost of capital itself is difficult to understand and determine.
3. It does not give solutions when the comparable projects are involved in different amounts of investment.
4. It does not give correct answer to a question when alternative projects of limited funds are available, with unequal lives.

Example 6: The Beta Co.Ltd., considering the purchase of a new machine. Two alternative machines X and Y have been suggested, each having an initial cost of Rs.40,000/- and requiring Rs.2,000/- as additional working capital at the end of 1<sup>st</sup> year. Earnings after taxes are expected as follows:

Year	Cash inflows	
	Machine X (Rs.)	Machine Y (Rs.)
1	4,000	12,000
2	12,000	16,000
3	16,000	20,000
4	24,000	12,000
5	16,000	8,000

The company has a target return on capital of 10% and on this basis you are required to compare the profitability of the machines and state which alternative you consider as financially preferable.

**Note:** The following table gives the present value of Re.1 due in 'n' number of years:

Year	1	2	3	4	5
P. Value 10 %	.909	.826	.751	.683	.621



**Solution :** Statement showing the profitability of two machines.

Year	P.V Factor	Machine X		Machine Y	
		Cash inflow (Rs.)	Present value (Rs.)	Cash inflow Rs.	Present value Rs.
1.	.909	4,000	3,636	12,000	10,909
2	.826	12,000	9,917	16,000	13,222
3	.751	16,000	12,021	20,000	15,026
4	.683	24,000	16,392	12,000	8,196
5	.620	16,000	9,934	8,000	4,967
Total present value of inflows			51,900		52,320
Total Present value of outflows (Rs. 40,000 + 2,000 x .9091)			41,818		41,818
Net Present value			<b>10,082</b>		<b>10,502</b>

**Recommendation :** Machine Y is preferable to Machine X. Though total cash inflow of Machine X is more than the of Machine Y by Rs.4,000/- the net present value of cash flows of Machine Y is more than that of Machine X. Moreover, in case of Machine Y, cash inflow in the earlier years is comparatively higher than that of Machine X.

**IIIu. 7 :** Ambani Brothers purchased a machine 5 years ago at a cost of Rs.75,000. The machine had an expected life of 15 years at the time of purchase and a zero estimated salvage value at the end of 15 years. It is being depreciated on a straight line basis and has a book value of Rs.50,000/-. The purchase manager reports that he can buy a new machine for Rs. 1,00,000/-. The existing sales are Rs. 1,00,000/- and are expected to go up to Rs.1,10,000/- on account of purchase of the new machine. Further, it will reduce the operating cost from Rs.70,000 to Rs.50,000. The old machine's current market value is Rs.10,000. Taxes at present levied at the rate of 50% and the firm's cost of capital is 10%. Calculate the net cash outlay of the project and net cash inflows.

**Solution:**

(i) Net cash outlay of the new project

	Rs.	Rs.
Invoice price of new machine		1,00,000
Less: Tax savings*	20,000	
Salvage value of old machine	10,000	30,000
		70,000

(\* Taxable income of the firm will be reduced by the amount of loss on sale of machinery amounting to Rs.40,000. The tax rate is 50% and hence, there will be a tax saving of Rs.20,000.

(ii) Estimated net cash in flows)

	Without new machine Rs.	With new machine Rs.
Sales....(I)	1,00,000	1,10,000
Less: Operating costs	{ 70,000	{ 50,000
Depreciation(D) ....(ii)	{ 5,000	{ 10,000
	75,000	60,000
Taxable income..(i)-(ii)	25,000	50,000
Less: Income tax	12,500	25,000
Profit after tax (P)	12,500	25,000
Cash inflow (P)+(D)	17,500	35,000

If the new machine is purchased, there will be an incremental cash inflow of Rs.17,500/-.

#### 4.4.2 Internal Rate of Return (IRR) :

Internal rate of return (IRR) is also known as Time adjusted return or Discounted rate of return. This method is also based on the principle of present value. This method considers the relative importance of magnitude and timing of cash flows. The use of this method for appraising the investment projects was for the first time used by Joel Dean.

According to Grunewald and Nemmers, the internal rate of return (IRR) can be defined as the rate of interest that equates the present value of future period net cash flows, with the present value of the capital expenditure required to undertake a project."

Weston and Brigham defined the internal rate as the rate that equates the present value of the expected future receipts to the investment outlay."

Thus the internal rate of return can be defined as "the rate of return which would equate the present value of the investment outlay to the present value of net cash benefits."

If the IRR is greater than the cost of capital, the funds invested will earn more than their cost. When IRR of a project equals the cost of capital, the management would be indifferent to the project as it would not be expected to change the value of the firm.

The following equation is used to calculate the internal rate of return.

#### Formula:

$$IRR = \frac{A_1}{(1+r)^1} + \frac{A_2}{(1+r)^2} + \frac{A_3}{(1+r)^3} + \dots + \frac{A_n}{(1+r)^n}$$

Where,

$A_1, A_2, A_n$  etc. = Expected future cash inflows at the end of year 1,2,3 and so on.

$Co$  = Initial Capital outlay.

$r$  = rate of interest

$n$  = number of years of project life

In order to find out the exact IRR between two near rates, the following formula is to be used.

$$IRR = L + \frac{P_1 - C_0}{P_1 - P_2} \times D$$

where

$L$  = Lower rate of interest

$P_1$  = Present value at lower rate of interest

$P_2$  = Present value at higher rate of interest

$C_0$  = Cash outlay

$D$  = Difference in rate of interest

### Computation of IRR :

The Internal rate of return is to be determined by trial and error method. The following steps can be used for its computation.

- i. Compute the present value of the cash flows from an investment, by using an arbitrary selected interest rate.
- ii. Then compare the present value so obtained with Capital outlay.
- iii. If the present value is higher than the cost, then the present value of inflows is to be determined by using higher rate.
- iv. This procedure is to be continued until the present value of the inflows from the investment are approximately equal to its outflow.
- v. The interest rate that brings about this equality is the internal rate of return.

If the internal rate of return exceeds the required rate of return, then the project is accepted. If the project's IRR is lower than the required rate of return, it will be rejected. In case of ranking the proposals, the technique of IRR is significantly used. The projects with highest rate of return will be ranked as first compared to the lowest rate of return projects.

Thus, the IRR acceptance rules are

Accept if  $r > k$

Reject if  $r < k$

May accept or reject if  $r = k$

Where  $r$  is the internal rate of return  
 $k$  is the cost of capital.



**Merits: The following are the merits of the IRR method:**

1. **Consideration of Time Value of Money :** It considers the time value of money.
2. **Consideration of total Cash Flows:** It takes into account the cash flows over the entire useful life of the asset.
3. **Maximisation of shareholders' wealth:** It is in conformity with the firm's objective of maximising owners' welfare.
4. **Provision for risk and uncertainty:** This method automatically gives more weight to money values which are nearer to the present period than those which are distant from it. Conversely, in case of other methods like 'Payback Period' and 'Accounting Rate of Return', all money units are given the same weight which is unrealistic. Thus, the IRR is more realistic method of project valuation. This method improves the quality of estimates reducing the uncertainty to minimum.
5. **Elimination of Pre-determined discount rate:** Unlike the NPV method, the IRR method eliminates the use of the required rate of return which is usually a pre-determined rate of cost of capital for discounting the cash flow streams. The IRR method itself provides a rate of return which is more realistic and consistent with the cost of capital. Therefore, the IRR is more reliable measure of the profitability of the investment proposals.

**Demerits: The following are the demerits of the IRR :**

1. It is very difficult to understand and use
2. It involves a very complicated computational work
3. It may not give unique answer in all situations.
4. The assumption of re-investment of cash flows may not be possible in practice.
5. In evaluating the mutually exclusive proposals, this method fails to select the most profitable project which is consistent with the objective of maximisation of shareholders wealth.
6. The results of this method may be inconsistent compared to NPV method, if the projects differ in their (a) expected lives (b) investment or (c) timing of cash inflows.

**Example.8: A company has to select one of the following two projects :**

	Project - A (Rs.)	Project - B (Rs.)
Capital outlay	11,000	10,000
Cash inflows (Years)		
1	6,000	1,000
2	2,000	1,000
3	1,000	2,000
4	5,000	10,000

Using the Internal Rate of Return suggest which project preferable.

**Solution:** The cash inflow is not uniform and hence the internal rate of return will have to be calculated by the trial and error method. In order to have an approximate idea about such rate, it will be better to find out the 'Factor'. The factor reflects the same relationship of investment and 'cash inflows' as in the case of pay back period calculations :

Therefore

$$F = I/C$$

Where,

F = Factor to be located;

I = Original Investment;

C = Average cash inflow per year

The 'Factor' in case of project - A in the above example would be :

$$F = 11,000/3,500 = 3.14$$

Where as in case of project - B the the 'Factor' would be :

$$F = 10,000/3,500 = 2.86$$

The Factor thus calculated will be located the Table value in P.V.Table-II on the line representing the year corresponding to the estimated useful life of the asset. This would give the expected rate of return to be applied for discounting the cash inflows for the internal rate of return.

In case of project-A, the rate comes to 10% while in case of project-B it comes to 15%

#### Project - A

Year	Cash inflows Rs.	discounting factor at 10%(Table-I)	Present value of cash inflows Rs.
1	6,000	0.909	5,454
2	2,000	0.826	1,652
3	1,000	0.751	751
4	5,000	0.683	3,415
<b>Total Present Value</b>			<b>11,272</b>

The present value at 10% comes to Rs.11,272. The initial investments is Rs.11,000. Internal rate of return may be taken approximately at 10%.

But, for knowing the exactness another discount are which is slightly higher than 10% (since at this rate the present value is more than initial investment) may be taken. Let us consider a rate of 12%, the following results would emerge;

Year	Cash inflows Rs.	Discounting factor at 12%	Present value Rs.
1	6,000	0.893	5,358
2	2,000	0.797	1,594
3	1,000	0.712	712
4	5,000	0.636	3,180
<b>Total present value</b>			<b>10,844</b>

The internal rate of return is thus more than 10% and less than 12% since the present values at the two discount rates are one is more than the capital outlay and another one is less than it. Hence, to get the exact discount rate at which the present values of cash inflows are equal to the capital outlay, the following interpolation can be done by using the following formula.

$$IRR = L + \frac{P_1 - C_0}{P_1 + P_2} \times D$$

Where,

- L = Lower rate of interest
- $P_1$  = P.V. of cash inflows at lower rate of interest
- $P_2$  = P.V. of cash inflows at higher rate of interest
- $C_0$  = Capital outlay
- D = difference in the rates, of interests

$$\begin{aligned} IRR &= 10 + \frac{11,2272 - 11,000}{11,272 - 10,844} \times 2\% \\ &= 10 + \frac{272}{428} \times 2\% = 11.3\% \end{aligned}$$

Alternatively :

The exact internal rate of return can also be calculated as follows :

At 10% the present value is + 272

At 12% the present value is - 156

The internal rate would therefore be between 10% and 12% can also be identified as under :

$$\begin{aligned} &= 10\% + \frac{272}{(272 + 156)} \times 2 \\ &= 10 + 1.3 = 11.3\% \end{aligned}$$



## PROJECT - B

Year	Cash inflows Rs.	Discounting factor at 15%	Present value Rs.
1	1,000	0.870	870
2	1,000	0.756	756
3	2,000	0.658	1,316
4	10,000	0.572	5,720
<b>Total present value</b>			<b>8,662</b>

Since the present value at 15% comes only to Rs.8,662 and the fore a lower rate of discount should be taken. Let us the a rate of 10%, the following will be the result.

Year	Cash inflows Rs.	Discounting factor at 10%	Present value Rs.
1	1,000	0.909	909
2	1,000	0.826	826
3	2,000	0.751	1,502
4	10,000	0.683	6,830
<b>Total present value</b>			<b>10,067</b>

The present value at 10% comes to Rs.10,067 which is more than the initial investment. Hence, the internal rate of return may be taken as 10%. approximately.

In order to have more exactness, the internal rate of return can be intarpolated as done in case of project - A.

At 10% the present value is + 67

At 15% the present value is - 1,338

Alternatively

$$IRR = 10\% + \frac{67}{67 + 1,338} \times 5$$

$$IRR = 10\% + \frac{67}{1,405} \times 5 = 10\% + 0.24 = 10.24\%$$

$$IRR = 10 + \frac{10067 - 10,000}{10067 - 8662} \times 5$$

$$IRR = 10 + \frac{67}{1405} \times 5$$

$$= 10.24\%$$

Thus, the internal rate of return in case of project-A is higher as compared to project-B. Hence , project-A is preferable. Which produces more amount of beenfit.

Example. 9 : A firm whose cost of capital is 10% is considering two mutually exclusive projects X and Y, the details are :

	Project X Rs.	Project Y Rs.
Investment	70,000	70,000
Cash flow year 1	10,000	50,000
Cash flow year 2	20,000	40,000
Cash flow year 3	30,000	20,000
Cash flow year 4	45,000	10,000
Cash flow year 5	60,000	10,000
Total cash flows	1,65,000	1,30,000

Compute the Net present value at 10% and Internal rate of return for these two projects.

**Solution:**

- (i) Net present value of the two mutually exclusive projects, cost of capital of the firm being 10 percent.

Year	Cash Flows (Rs.)		P.V.Factors at 10%	Discounted Cash Flows (Rs.)	
	Project X	Project Y		Project X	Project Y
0	(-) 70,000	(-) 70,000	1.000	(-) 70,000	(-) 70,000
1	10,000	50,000	.909	9,090	45,450
2	20,000	40,000	.826	16,529	33,040
3	30,000	20,000	.751	22,530	15,020
4	45,000	10,000	.683	30,735	6,830
5	60,000	10,000	.621	37,260	6,210
	<b>Net Present Value (Rs.)</b>			<b>46,135</b>	<b>36,550</b>

- (ii) Internal Rate of Return for the two projects:

Project X :

Year	Cash flows (Rs.)	P.V.Factor at 25%	Discounted Cash Flows (Rs.)	P.V. Factor at 30%	Discounted Cash Flows (Rs.)
0	(-) 70,000	1.000	(-) 70,000	1,000	(-) 70,000
1	10,000	.800	8,000	.769	7,690
2	20,000	.640	12,800	.592	11,840
3	30,000	.512	15,360	.455	13,650
4	45,000	.410	18,450	.350	15,750
5	60,000	.328	19,680	.269	16,140
	<b>Net Present Value (Rs.)</b>		<b>4,290</b>		<b>(-) 4,930</b>



$$IRR = 25\% + \frac{4,290}{9,220} \times 5$$

$$= 25 + 2.33 = 27.33\%$$

Project Y :

Year	Cash flows (cfat) (Rs.)	P.V.Factor at 35%	Discounted Cash Flows (Rs.)	P.V.Factor at 40%	Discounted Cash Flows (Rs.)
0	(-) 70,000	1.000	(-) 70,000	1,000	(-) 70,000
1	50,000	.741	37,050	.714	35,700
2	40,000	.549	21,960	.510	20,400
3	20,000	.406	8,120	.364	7,280
4	10,000	.301	3,010	.260	2,600
5	10,000	.223	2,230	.186	1,860
<b>Total Present Value</b>			2,370		(-) 2,160

$$IRR = 35 + \frac{2,370}{4,530} \times 5 = 37.61\%$$

Hence, the IRR of project Y is greater (37.61) than the project X (27.33)

#### 4.4.3 Profitability Index (PI) :

This method is also known as 'Benefit Cost Ratio'. According to Van Horne, the profitability Index of a project is "the ratio of the present value of future net cash flows to the present value of initial cash outflows".

$$\text{Profitability Index} = \frac{\text{Present value of cash inflows}}{\text{Present value of cash outflows}}$$

On the basis of this criteria, the projects can be accepted when the profitability index is equal to or greater than '1' (one).

**Merits : The merits of this method are :**

- i. It takes into account the time value of money
- ii. It helps to accept / reject investment proposals on the basis of value of the index.
- iii. It is useful to rank the proposals on the basis of the highest / lowest value of the index.
- iv. It takes into consideration the entire stream of cash flows generated during the life of the asset.

**However, this technique suffers from the following limitations :**

- i). It is some what difficult to understand
- ii). It is difficult to understand the analytical part of the decision on the basis of profitability index.

**Example.10**

Consider the information given in example 9.

**Project : X**

The present value of total cash inflow is Rs.1,16,135 and the present value of outflow is Rs.70,000

$$\text{Profitability Index (PI)} = \frac{\text{Rs. } 1,06,550}{\text{Rs. } 70,000} = 1.659$$

**Project : Y**

The present value of total cash inflow is Rs.1,06,550 and the present value of out flow is Rs. 70,000

$$\text{Profitability Index (PI)} = \frac{\text{Rs. } 1,06,550}{\text{Rs. } 70,000} = 1.522.$$

Since the profitability Index of project X (1.659) is greater than profitability index of project Y (1.522), it is advisable to accept the project X.

**Example 11.** Calculate the profitability index from the information given below. Cost of project Rs.60,000 ; life of the project 5 years. Annual cash inflow Rs.20,000; cost of capital 10%

**Solution:**

Calculation of profitability index :

Year	CFAT	P.V.Factor 10%	Total present Value
1-5	Rs. 20,000	3.791	Rs. 75,820

$$\text{Profitability Index (PI)} = \frac{\text{Rs. } 75,820}{\text{Rs } 60,000} = 1.263.$$

**4.5 NET PRESENT VALUE VS. PROFITABILITY INDEX :**

In most of the situations the NPV and PI as investment criteria, provide the same accept or reject decision. and both the methods are closely related to each other. Under PI method, the investment proposal will be accepted, if the PI is greater than one, PI will be greater than one when the investment

proposal has a positive NPV. On the other hand, PI will be less than one when the investment proposal has negative NPV. In case of mutually exclusive investment proposals these methods may give different rankings. The following example present such a case.

Year	Project A Rs.	Project B Rs.
0 (outflows)	-5,000	-3,500
1 (inflows)	4,000	3,000
2 (inflows)	4,000	3,000
Present value of cash inflows @ 10%	6,944	5,208
Less cash outflows	5,000	3,500
NPV	1,944	1,708

$$\text{Profitability Index} = \frac{6,944}{5,000} = 1.39 \quad \frac{5,208}{3,500} = 1.49$$

Thus, project A is acceptable under NPV method, while project B is acceptable under PI method. Which project should the company accept? As explained earlier, the NPV technique is superior so, project A should be accepted. The best project is one which adds the most, among the available alternatives, to the shareholders wealth. So, one can say that NPV method gives a better mutually exclusive choice than PI and guarantees the choice of the best alternatives.

#### 4.6 NET PRESENT VALUE VS. INTERNAL RATE OF RETURN (IRR)

The NPV and IRR methods are similar in several respects. In certain cases they would give the same accept or reject decision but they give different decision in certain other cases. The comparison of these methods involves the discussion of between the methods :

- i) Similarities
- ii) Differences

##### Similarities :

The two methods would give consistent results in terms of acceptance or rejection of investment proposals in certain situations. If a project is sound it will be indicated by both the methods. If the project does not qualify for acceptance, both methods will indicate that it should be rejected.

##### Conventional and Independent projects :

In case of conventional and independent projects both NPV and IRR methods will give the same accept-reject decision. A conventional project is one in which the cash flow pattern is such that an initial Capital outlay is followed by cash inflow. capital outflows are confined to the initial period that is, in the beginning.



The independent projects refer to the investment proposals the acceptance of which does not make rejection of another profitable project. All profitable proposals can be accepted, if funds are available. There are no other constraints in accepting all profitable projects. Some projects would be indicated profitable by both NPV and IRR methods. The logic is all projects with positive NPV would be accepted, if NPV method is used or projects with IRR higher than the required rate of return would be accepted, if the IRR method is followed. The last project acceptable under NPV is one which has zero net present value, while using the IRR method this project will have an IRR equal to required rate of return. Projects with positive net present values would also have internal rate of return higher than the required rate of return. Marginal or last project will have zero net present value only, when its internal rate of return is equal to the required rate of return. NPV and IRR methods are equivalent as regards the acceptance or rejection of conventional and independent projects.

**Decision Rule :**

Accept a project        if NPV is greater than zero ( $NPV > 0$ )  
                                  if IRR is greater than required rate of return ( $IRR > k$ )  
May accept/            if NPV is equal to zero ( $NPV = 0$ )  
reject a project        if IRR is equal to required rate of return ( $IRR = K$ )  
reject a project if NPV is Negative or less than zero ( $NPV < 0$ )  
                                  if IRR is less than required rate of return ( $IRR < K$ )

Projects which have positive NPV will also have an IRR higher than the required rate of return

Projects which have negative NPV will also have an IRR lower than the required rate of return.

Projects which have zero NPV will also have an IRR equal to the required rate of return.

**Differences :**

In case of independent and conventional Projects, NPV and IRR methods will give the same result. However, in certain situations they will give contradictory answers. If NPV method finds one proposal acceptable, IRR favours another. This happens in case of mutually exclusive projects.

**Mutually Exclusive projects:**

Mutually exclusive projects are those projects where the acceptance of one proposal makes the rejection of another one. If there are alternative courses of action, only one can be accepted, such alternatives are mutually exclusive. The mutual exclusiveness may be of two types. i) Technical, and ii) Financial.

For example, in order to distribute its products, a company may decide either to establish its own sales organisation or engage outside distributor. The more profitable, out of the two alternatives shall be selected. Ranking projects become crucial in case of mutually exclusive projects. Since, the NPV and IRR rules can give conflicting ranking of projects. In case of ranking given by NPV and IRR methods is different for mutually exclusive projects, it is advisable to use NPV method which is consistent with the objective of maximising wealth of the shareholders.

## ii) Non - Conventional Investments:

Non-conventional investments are the investments, whose cash outlay may not yield a series of cash inflows. Further, investment may be required to make use of the project. The project may require additional investment during its life time. A classic example of non-conventional investment pattern is that the purchase of an asset generates cash inflows for a period of years, is overhauled, and again generates a stream of cash inflows for a number of years. A machine may be purchased for Rs.1,00,000/- and generates cash inflows of Rs.25,000/- each for seven year. In the eighth year an outlay (investment) of Rs.40,000/- is required to overhaul the machine, after which, it generates cash inflows of Rs.25,000 each for 7 years.

In this case, the NPV and IRR methods will give conflicting ranking to the projects. Because, IRR methods, yields more than one rate of return. The number of rates of return depend on the number of times the sign of cash flow stream changes. In order to solve this problem, it is advisable to use NPV method in selecting non-conventional investment projects.

### NPV and IRR choice of the Methods:

In the case of conventional and independent projects as the both methods, NPV and IRR, give the same results. However, in case of mutually exclusive projects and projects with non-conventional investments NPV and IRR methods give contradictory results. Then it is advisable to use NPV method because of its superiority over IRR. Moreover, the NPV method is consistent with the objective of maximising the wealth of the shareholders.

## 4.7 CAPITAL RATIONING :

Capital rationing refers to the situation where budgetary or fund constraints are imposed on the firm and the firm may not be in a position to invest its available scarce resources in all the acceptable projects. According to Weston and Brigham, "capital rationing is a situation where a constraint is placed on the total size of funds invested" during a particular periods. "Under the situation of capital rationing, it is not possible on the part of the company to select all the available investment proposals due to financial constraints". Hence, the company has to rank the proposals applying the techniques of appraisals and finally select the best proposals within the available funds.

### Causes for Capital Rationing

The reasons for imposing restrictions on the finances of the company and evidence of capital rationing are as follows:

- i. It is difficult to raise funds through external sources;
- ii. Some firms may impose limitations on capital expenditure due to lack of managerial resources;
- iii. A firm may resort to capital rationing due to the reason that its cost of capital may rise by way of raising additional funds and ;
- iv. Some may not be interested in further expansion, but they may be interested to stabilise the present position.



### Project Selection under Capital Rationing:

Selection of projects under capital rationing is made by :

- a. ranking the projects according to Internal Rate of Return or Profitability Index.
- b. selecting the projects in descending order of the ranks until the budgeted funds are exhausted.
- c. not selecting the investment project with negative Net Present Value (NPV) or Internal Rate of Return (IRR) or below the cost of capital.

### 4.8 SUMMARY :

Capital budgeting involves the firms decisions to invest its current funds most efficiently in long-term projects, in anticipation of expected flow of future benefits over a series of year.

The capital budgeting decisions include replacement, expansion, diversification, research and development and miscellaneous proposals. Capital budgeting decisions are important because they involve investment of heavy funds, with long - term implications. These decisions are most difficult to take.

The capital budgeting process involves generation of investment proposals, estimation and evaluation of cash flows, selection of projects based on acceptance criterion and finally continuous evaluation of investments

A sound appraisal method should enable the company to measure the real worth of the investment proposal. There are two traditional methods and three discounted cash flow methods for this purpose. They are the pay back method and the accounting rate of return in the first group and the net present value, internal rate of return and profitability index methods in the second group.

Capital rationing is a situation where a constraint is placed on the total size of funds invested during a particular period. Some reasons for capital rationing include self imposed and some are external reasons.

### 4.9 Key words :

**Accounting Rate of Return** Also called Average Rate of Return. It is calculated by dividing the average income after taxes by the initial outlay of a project. A variant of this is presented by the average income after taxes by the average investment.

**Benefit Cost Ratio** Also called as Profitability Index. Used to evaluate capital expenditure proposals, it is calculated by dividing the present value of cash inflows by the initial outlay.

**Cash Flows** Actual receipts and payments by a firm.

**Discounting** The process of finding out the present value of a series of future cash flows.

**Investment Decision** Refers to capital budgeting decision i.e. investment in long - term assets.

**Payback period** The number of years required to recover the investment required by a project.

**Present value** The value of sums received in future being discounted by an appropriate capitalisation rate.

**Net present value** Net present value represents the difference between the present value of future cash flows associated with a project and the present value of the initial investment to acquire the project.



**Internal Rate of Return.** The Rate of Return that equates the present value of future cash flows to the initial investment on the project.

#### 4.10 SELF ASSESSMENT QUESTIONS EXERCISIS

##### Short Questions

- 1). What is pay bach period ? Discurs its merits and demerits.
- 2). Why are traditional methods of capital budgeting still popular ?
- 3). What is time value of money? Explain its impartance in the Financil Decesions.
- 4). What is Net Present Value Method? How do you calulate with an example ?

##### Essay questions

5. What do you mean by Discounted Cash Flow techniques? Explain NPV and Profitability Index methods to fulfill the requirements of time value of money.
6. Define Internal Rate of Return, How are project selection taken under this method?
7. Define capital rationing and explain the causes How are the project selection made under capital rationing ?
8. Following are the details of free project A,B and C.

Project	A	B	C
Cost (Rs.)	50,000	70,000	70,000
Life	10 Years	12 Years	14 Years
Estimated Scrap (Rs.)	5,000	10,000	7,000
Annual Profit Less Taxation (Rs.)	5,000	6,000	5,500

Calculate the pay back period.

(Ans: Project A 5.26 Years; Project B: 6.36 years, Project C: 7 years)

9. The Directors of Gama Ltd., are considering the purchase of a new Machine. Two Machines costing Rs.60,000 each are available. Each machine has an expected life of 5 years. The cosporate tax rate is 50%Net profit before tax during the expected life of each machine are given as follows :

Year	Machine X Rs.	Machine Y Rs.
1	15,000	5,000
2	20,000	15,000
3	25,000	20,000
4	15,000	30,000
5	10,000	20,000
	85,000	90,000

Following the method of Return on Investment ascertain which of the alternatives will be more profitable.

(Ans : Average Profit (after tax) : Machine X Rs.8,500; Machine Y Rs.9,000; Average Investment : Machine X Rs.30,000; Machine Y Rs.30,000; Average Rate of Return : Machine X : 28.33%; Machine Y 30% ; Thus, Machine Y is more profitable as against Machine X )

10. Mehta Co. Ltd., is considered the purchase of a new machine. Two Machines A and B are available each costing Rs.1.00.000. Earnings after taxation are as under :

Year	Machine X (Rs.)	Machine Y (Rs.)
1	30,000	10,000
2	40,000	30,000
3	50,000	40,000
4	30,000	60,000
5	20,000	40,000
	1,70,000	1,80,000

Calculate the ARR for each machine.

(Ans : Average Cash Inflows : Machine A Rs.34,000; B Rs.36,000; Average Investment : Machine A Rs.50,000; Machine B Rs.50,000; Annual Depreciation : Machine A Rs.20,000; Machine B Rs.20,000 ; ARR for Machine A 28%; ARR for Machine B 32%)

11. Sundaram Ltd. is planning to increase its present capacity and is considering the purchase of a new machine. Machine M and N are available at a price of Rs.80,000 and Rs.90,000 respectively. The company can buy either of the two machines. Cash flows on these machines are estimated as follows:

Year	Cash Inflows (Rs)	
	Machine M	Machine N
1	25,000	26,000
2	30,000	34,000
3	40,000	28,000
4	28,000	40,000
5	12,000	25,000
6		17,000

There is no salvage value. of both the Machines as the end of their lives .

Which of the two machines should the company buy? Decide on the basis of (i) payback period, and (ii) average rate of return.

(Ans: (i) Payback period : Machine M:2.63 years, Machine N:3.05 years; (ii)ARR : Machine M 27.5%, Machine N 29.6% Machine A is preferable )



- 12). Praga Tools Ltd., is considering an investment proposal. The cost of the project is Rs.50,000/- and has a life of 5 years with no salvage value, the company's tax rate is 55% and the firm uses straight line method of depreciation. The required rate return of the proposal is 10%. The estimated cash flows before tax (CFBT) from the proposed investment are :

<u>Year</u>	<u>CFBT(Rs.)</u>
1	10,000
2	11,000
3	14,000
4	15,000
5	25,000

Calculate Pay back period, ARR , IRR, NPV, and PI

(Ans) PBP 4.328 years ; ARR 9% ; IRR 6.59 ; NPV - Rs.4,648 ; and PI 0.907

- 13) DCM Ltd., considering mutually exclusive project A and B each involving a cost of Rs.3,00,000/- .The expected life of the project is 5 years for which the cash flows after tax (CFAT) are given below.

<u>Year</u>	<u>Project A</u>	<u>Project B</u>
1	1,00,000	50,000
2	1,00,000	50,000
3	1,00,000	1,00,000
4	1,00,000	2,00,000
5	1,00,000	1,00,000

The required rate of return is 15%. Decide which project should be selected by computing a) Pay back period b) Accounting rate of return c) Net present value d) Internal rate of return and e) Profitability index.

(Ans :

- 14) A machine was purchased 4 years ago for Rs. 70,000/- has been depreciated to a book value of Rs. 50,000/-. The machine originally had a project life of 14 years and a zero salvage value. A new machine will cost Rs. 1,30,000/-. Its installation cost estimated by the technician is Rs. 20,000/-. The technician also estimates that the installation of a new machine will result in a reduced operating cost of Rs. 15,000/- per year for the next 10 years. The old machine could be sold for Rs. 80,000/-. The new machine will have a ten year life with no salvage value. The company's normal income is taxed at 55% and gains at 30%. Assuming the cost of capital is 10%, determine whether the existing machine should be replaced. Use discounted cash flow criteria, i.e. NPV and IRR.

(Ans) NPV Rs. 8,723.75, IRR 7.53%.

- 8) A company is considering the purchase of a delivery van and is evaluating the following two choices.

- 1) The company can a used van for Rs. 20,000/- after 4 years sell the same for Rs. 2,500/- (net of taxes) and replace it with another used van which is expected to cost Rs. 30,000/- and lost 6 years with no terminating value.
- 2) The company can buy a new van for Rs. 40,000/-. The projected life of the van is 10 years and has an expected salvage value (net of taxes) of Rs. 5,000/- at the end of tenth year.

The services provided by both the vans are same. Assuming the cost of capital 10%, which choice is preferable ?

(Ans) : Present value of outflows of choice 1 is Rs. 38,782, whereas the present value of outflows of choice 2 is Rs. 38,070. Hence choice 2 is preferable.

- 16) A company working against a self-imposed capital budgeting constraint of Rs. 3,50,000/- is trying to decide which of the following investment proposals should be undertaken by it? All the investments are mutually independent (do not affect one another's cash flows). The list of investments along with the investment required and the net present value of the projected cash flows are as follows :

Investments	Outlays (Rs.)	NPV (Rs.)
A	50,000	30,000
B	1,20,000	90,000
C	1,60,000	1,00,000
D	1,10,000	1,50,000
E	90,000	1,00,000

Which investments should be acquired by the company ?

(Ans) D,E and B.

- 10) A textile company currently expects its after-tax profits (EAT) for the next 5 years to be as follows :

Year	1	2	3	4	5
EAT (Rs.)	34,000	28,000	60,000	44,000	50,000

The firm is considering to replace the existing machine with one costing Rs. 27,000/-. The new machine would cost Rs. 3,000/- to install and would be depreciated over 5 years to zero salvage value. The existing machine was purchased for Rs. 12,000/- three years ago and is being depreciated by the straight line method over an 8-years period. It can be sold for Rs. 15,000/- currently with Rs. 1,000/- removal cost.

If the expected after-tax profits, after the acquisition of new machine are as given below, at what approximate rate of cost of capital would the firm be indifferent regarding the purchase of new machine? The firm is taxed at a rate of 55% on normal income and 30% on capital gains.

Year	1	2	3	4	5
EAT (Rs.)	40,000	28,000	65,000	50,000	55,000

Also suggest at which rates of cost of capital the firm would (i) accept and, (ii) reject the proposed investment? What is the economic logic for your answer?

(Ans) i) Less than 36% ii) More than 36%

#### 4.11 FURTHER READINGS

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- James, C. Van Horne : Financial Management and Policy  
New Delhi, Prentice-Hall of India., New Delhi.
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**LESSON : 5****CAPITAL BUDGETING : UNDER RISK****OBJECTIVES :**

The objectives of this lesson are to explain :

- 1) the meaning of risk and sources of risk in capital budgeting.
- 2) the conventional techniques to handle risk.
- 3) the use of statistical techniques in handling risk.
- 4) the concepts of standard deviation and Co-efficient of variation in measuring risk.
- 5) the various steps involved in constructing decision tree.

**STRUCTURE:**

- 5.1 Introduction**
- 5.2 Risk analysis in capital Budgeting**
- 5.3. Nature of Risk**
- 5.4. Techniques for Measurement of Risk**
- 5.5 Summary**
- 5.6 Keywords**
- 5.7 Self Assessment Questions**
- 5.8 Further Readings.**

**5.1 INTRODUCTION**

In the previous lessons you have learnt the meaning and the process of capital budgeting. along with the various techniques for evaluating capital budgeting proposals. The basic assumption was that the investment proposal did not involve any kind of risk. This assumption made simple the understanding of capital budgeting techniques. In real world situation the firm, in general, and its investment projects in particular, are exposed to different degrees of risk. The risk arises in capital budgeting projects since one cannot estimate the future cash flows with certainty. Consequently we can not predict, accurately, the cash flow sequence.

The objective of this lesson is to explain the meaning and sources of risk and various techniques both conventional and statistical to handle risk.



## 5.2 RISK ANALYSIS IN CAPITAL BUDGETING

It is possible to predict the outcome of some decisions with complete certainty because only one outcome can arise. However, there are many occasions when decisions can lead to more than one possible outcome, such situations are surrounded with uncertainty. The traditional difference between risk and uncertainty is that the uncertainty cannot be quantified while risk can be quantified. Risk is concerned with the use of quantification of the likelihood of future outcomes. The word uncertainty is to cover all future outcomes, which cannot be predicted with accuracy. People have different attitudes towards the future. Some welcome the opportunity to take risk they may be called risk takers or risk seekers and others are risk averse.

An organisation's performance is influenced by the elements contained within its environment. In turn the organisation also has an impact on its environment. The very survival of an organisation depends critically upon the willingness of its environment to sustain it. It is the role of the management to predict events that are likely to occur to meet the challenges and to take advantage of any new opportunity.

## 5.3 NATURE OF RISK

Risk analysis should be incorporated in capital budgeting exercise. The capital budgeting decisions are based on the benefits derived from the project. These benefits measured in terms of cash flows are estimates. The estimation of future returns is done on the basis of various assumptions. The actual return in terms of cash inflows depends on a variety of factors such as price, sales volume, effectiveness of advertising, competition, cost of raw materials, manufacturing cost and so on. Each of these in turn, depends on other variables like state of the economy, rate of inflation, etc. The accuracy of the estimates of future returns and the reliability of the investment decision would largely depend upon the accuracy with which these factors are forecasted. The actual return will vary from the estimated return, which is technically referred to as risk.

Thus risk with reference to investment decision is defined as "the variability in actual returns arise from a project in future over its working life in relation to the estimated return as forecast at the time of the initial capital budgeting decisions".

**5.3.1 Types of Risk:** The risk can be broken up into three types

- 1. Certainty:** It is a situation where the returns are assured and no variability likely to occur in future returns. For example investment in Government bonds, fixed deposits in a nationalized bank.
- 2. Uncertainty :** It is a situation where infinite number of outcomes are possible and probabilities can not be assigned.
- 3. Risk:** Risk is the variability that is likely occur in future returns from the investment. In other words, risk is a situation in which the probabilities of future cash flows occurring are known.

**5.3.2 Source of Risk :** As explained above, risk is associated with the variability of future returns of a project. The factors which will influence the future returns of the projects may be explained as follows :

- (a) **Size of the investment :** The size of the investment in terms of the amount required will determine the risk. Large scale projects are more risky than small scale projects example, a project involves for Rs. one crore investment involves more risk than a project with Rs.1,00,000/- investment.
- (b) **Life of the Project :** The life of the project will determine the risk involved. Longer the life of projects more is the risk, shorter the life of the projects less is the risk.
- (c) **Economic conditions :** There are certain conditions which will influence the general level of business activity. For example, economic and political situation in the country, Government monetary and fiscal policies, etc.
- (d) **Industry Factors :** These factors effect all the companies of the industry in the same way. For example : industrial relations in the industry, innovation, material cost, etc.
- (e) **Company Factors :** These are internal to the company which will effect a particular company only. For example, change in the management, strike in the company, fire accident in the company etc.

#### **5.4 TECHNIQUES FOR MEASUREMENT OF RISK :**

As seen above, various factors are responsible for variations in the returns of a proposed project. The greater the variability of the expected returns, the riskier the project. However, risk can be reduced (cannot be avoided) by using certain techniques in evaluating and selecting the projects. These techniques include (a) Conventional Techniques (b) Statistical Techniques.

##### **5.4.1 Conventional Techniques :**

A number of techniques to handle risk are used by managers in selecting capital budgeting projects. They range from simple rules of thumb to sophisticated statistical techniques. The following are the popular techniques to handle risk.

###### **5.4.1.1 Pay Back Period**

Pay back period is one of the oldest and commonly used methods for selecting capital budgeting projects. It is the period required to recover initial investment of the project. Firms using this method prefer short pay back period to longer pay back periods short period involves less risk compared to longer period. For example there are two projects A and B, project A pay back period is 3 years and project B pay back period is 6 years. If the pay back criteria is applied project A should be selected as its pay back period is less than project B. Thus the project A involves less risk than project B. Pay back period method makes an allowance for risk by emphasising liquidity of the firm and by favouring short-term projects.

###### **5.4.1.2 Risk Adjusted Discount Rate**

This method is based on the presumption that investors expect more rate of return on risky projects as compared to less risky projects. The required rate of return will be equal to risk free rate



plus risk premium. This method is similar to the net present value method, except adding some percentage of risk premium to risk free rate of return. Net Present Value may be computed by using the following formula.

$$NPV = \sum_{t=1}^n \frac{A_t}{(1+k)^t} - C_0$$

$A_t$	=	Cash inflows for period (t)
$n$	=	No. of years
$k$	=	Risk adjusted discount rate (Risk free rate + Risk premium)
$C_0$	=	Cash outflow

The risk adjusted discount rate accounts for risk, by varying the discount rate, depending on the degree of risk of investment projects. A higher rate will be used for with high risk project and lower rate for less risky project. The net present value will decrease with increasing  $k$ , indicating that the risky project is perceived, the less likely it will be accepted. For example, consider an investment project costing Rs. 50,000/- and is expected to generate cash flows of Rs.25,000/- and Rs.20,000/-, Rs.10,000/-, Rs. 10,000/-. What is the NPV, if it is discounted at 15% rate of return (10% risk free rate + 5% risk, premium)

$$NPV = \frac{25000}{(1+.15)^1} + \frac{20000}{(1+.15)^2} + \frac{10000}{(1+.15)^3} + \frac{10000}{(1+.15)^4} - 50000 = (-)Rs.845$$

Since the project's NPV is negative the project should be rejected.

### Advantages

- (a) It is easy to understand and simple to calculate
- (b) It recognise the risk involved in projects.

### Disadvantages

- (a) There is no easy way to determine risk adjusted discount rate
- (b) It does not make any adjustment in the numerator for the cash flows that are forecast over the future years.
- (c) It is based on the assumption that investors are risk averse.

#### 5.4.1.3 Certainty Equivalent Method

According to this method, the estimated cash flows are reduced to conservative level by applying a correction factor referred as a certainty equivalent coefficient. The correction factor is the ratio of riskless cash flow to risky cash flow.

$$\text{Certainty Equivalent Coefficient } (\alpha_t) = \frac{\text{Riskless Cash flow}}{\text{Risky Cash flow}}$$

For example, if one expected a risky cash flow of Rs. 80,000/- in period t and considers a certain cash flow of Rs. 60,000/- equally desirable, then  $a_t$  will be  $0.75 = 60,000 / 80,000$  under this method, certainty equivalent coefficients are calculated for cash flows of each year. They are then multiplied with the cash flows to ascertain cash flows which may be used for the purpose of determining NPV or IRR.

$$NPV = \sum_{t=1}^n \frac{\alpha_t A_t}{(1+k_f)^t} - C_o$$

Where

$A_t$	=	The forecast of net cash flow without risk adjustment.
$a_t$	=	Certainty equivalent coefficient for year t
$K_f$	=	risk less interest rate
$C_o$	=	Cash outflow.

A project costs Rs. 6,000 and it has cash flow of Rs. 4,000, Rs. 3,000, Rs. 2,000 and Rs. 1,000 in 1 to 4 years. Assumed that the associated certainty equivalent coefficient factors ( $\alpha_t$ ) are estimated to be  $\alpha_0 = 1.00$ ,  $\alpha_1 = 0.90$ ,  $\alpha_2 = 0.70$ ,  $\alpha_3 = 0.50$ , and  $\alpha_4 = 0.30$  and the risk free discount rate is 10 percent, the present value will be :

$$NPV = \frac{0.90 \times 4,000}{(1+0.10)^2} + \frac{0.70 \times 3,000}{(1+0.10)^2} + \frac{0.50 \times 2,000}{(1+0.10)^3} + \frac{0.30 \times 1,000}{(1+0.10)^4} - (1.00 \times 6,000) = (-) Rs.37$$

If the IRR is to be calculated we will calculate the rate of discount which equates the present value of certain equivalent cash inflows with present value of certain equivalent cash outflows.

#### **Risk adjusted discounted rate Vs. Certainty equivalent :**

The certainty equivalent method recognises the risk in capital budgeting by adjusting estimated cash flows and employ risk free rate to discount the adjusted cash flows. On the other hand, the risk-adjusted discount rate adjusts for risk by adding some risk premium to risk free rate of return and arriving the discount rate. Certainty equivalent approach is theoretically superior technique over the risk adjusted discount approach. It can measure risk more accurately. The risk adjusted discount approach will yield the same results, as the certainty equivalent approach if the risk free rate is constant and the risk adjusted discount rate is same for all future periods.

#### **5.4.1.4 Sensitivity Analysis :**

It is a technique, which indicates exactly how much the NPV/IRR will change in response to a given change in an input variable other things held constant. It indicates how sensitive a project NPV or IRR is to changes in particular variables. (Sales volume, price, variable cost, fixed cost, investment, project life etc.). The more sensitive the NPV, the more critical the variable. The following three steps are involved in the use of sensitivity analysis.

- Identification of all the variables which have an influence on the projects NPV or IRR.
- Establish the relationship between the variables.

(c) Analyse the impact of change in each of the variables on the projects NPV or IRR

The decision maker, while conducting sensitivity analysis computes the projects NPV or IRR for each forecast under three assumptions with the probability of their occurrence. a) pessimistic b) expected, and c) optimistic. It allows him to ask “what if” questions. For example

What is the NPV, if volume increases or decreases ?

What is the NPV, if variable cost or fixed cost increases or decreases ?

What is the NPV, if selling price increase or decreases ?

What is the NPV, if the project is delayed or outlay increases or the project's life is more or less than anticipated?

A whole range of questions can be answered with the help of sensitivity analysis. It examines the sensitivity of the variables (volume, cost, price, time, investment, life, etc.) underlying the computation, NPV or IRR rather than attempting to quantify risk.

$$NPV = \sum_{t=1}^n \frac{[Q(P - V) - F - D](1 - T) + D}{(1 + r)^t} + \frac{S}{(1 + r)^n} - I$$

Where

NPV	=	net present value of the project
Q	=	number of units sold annually
P	=	selling price per unit
V	=	variable cost per unit
F	=	total fixed cost, excluding depreciation and interest
D	=	annual depreciation charge
T	=	income tax rate
r	=	cost of capital / discount rate / required rate of return
n	=	project life in years
S	=	net salvage value
I	=	initial cost

#### Advantages :

- 1) It compels the decision maker to identify the variables which will influence projects NPV or IRR. This helps him in understanding the project in totality.
- 2) It indicates the critical variables which have negative impact on the project NPV or IRR.
- 3) It helps to expose in appropriate forecast and thus guides the decision maker to concentrate on relevant variables.

#### Limitations :

- 1) It does not provide clear cut results.
- 2) It fails to focus on the inter-relationship between variables, for example sales volume may be related to price, cost and expenditure over advertisement.

## 5.4.2 Statistical Techniques (Non-conventional)

In the above part of this lesson you have studied the meaning and sources of risk. In addition to this, conventional techniques to handle risk in capital expenditure projects are also explained. The purpose of this part is to explain the use of statistical techniques such as probability, standard deviation, coefficient of variation and decision tree in handling the risk of capital budgeting projects. These statistical techniques are analytical tools drawn from the fields of mathematics, logic, economics and psychology, enable the decision maker to make decision under certainty.

### 5.4.2.1 Probability Assignment

The concept of probability is one of the statistical techniques to handle risk in capital budgeting projects. It may be described as a “measure of some one’s opinion about the likelihood that an event will occur”. If an event is certain to occur, we can say that it has 100% probability of occurrence one. If an event is certain not to occur, we can say that its probability of occurring is zero. Thus the probability of occur all events lies between 0 and 1.

A probability of distribution may consist of number of estimates. But in simple form it may consist of a few estimates. Some commonly used form are “high, low and best guess” estimates, or optimistic, most likely and pessimistic” estimates. For example, the annual cash flows expected from a project could be :

Assumption of guess	Annual Cash flows (Rs)
Best	10,000
High	8,500
Low	4,000

It can be seen that this is an improvement over the single forecast. Which is not sufficient. The forecaster should describe more accurately his degree of confidence in his forecasts, i.e., he should describe his feelings as to the probability of these estimates occurring. For example, he may assign the following probabilities to his estimates:

Assumption of guess	Annual Cash flow (Rs)	Probability
Best	10,000	0.20
High	8,500	0.60
Low	4,000	0.20

Once the probability assignments are given to the future cashflows, the next step is to find out the expected net present value. The expected net present value can be found out by multiplying the monetary values of the cash flows by their probabilities. Consider the above example (assume investment as Rs. 6,000).

Assumption of guess	Annual cash flow (Rs)	Probability	Expected cash flow (Rs.)
Best	10,000	0.20	2,000
High	8,500	0.60	5,100
Low	4,000	0.20	800
Total Expected Cash flow			<b>7,900</b>

The forecaster considers the chance or probability of annual cash flows being either Rs. 10,000/- (maximum) or Rs. 4,000/- (minimum) is 0.20 (20%) each. There is 0.60 (60%) probability that annual cash flows may be Rs. 8,500/-.

**Example : 1** Opec Co.Ltd., has given the following possible cash inflows for two of their projects M and N both projects will require an equal investment of Rs. 5,000/-. You are required to suggest which project should be accepted at 10% discount rate.

Possible Events	Cash flow (Rs)	Project:M Probability	Project : N Cash flow (Rs)	Probability
A	4,000	0.10	12,000	0.10
B	5,000	0.20	10,000	0.15
C	6,000	0.40	8,000	0.50
D	7,000	0.20	6,000	0.15
E	8,000	0.10	4,000	0.10

**Solution :**

Calculation of expected cash flows for project M and N

Possible Event	Project : M			Project : N		
	Cash flow (Rs)	Probability	Expected Cash flow (Rs)	Cash Flow	Probability	Expected Cash flow (Rs.)
A	4,000	0.10	400	12,000	0.10	1,200
B	5,000	0.20	1,000	10,000	0.15	1,500
C	6,000	0.40	2,400	8,000	0.50	4,000
D	7,000	0.20	1,400	6,000	0.15	900
E	8,000	0.10	800	4,000	0.10	400
<b>Total</b>			<b>6,000</b>	<b>Total</b>		<b>8,000</b>

The above calculations show that project Y has higher expected cash flow as compared to project X. If expected cash flows are discounted @ 10% the net present value for project X will be : Rs.(6,000 x .909) - 5,000/- = Rs.454/-. The net present value of project Y will be (8,000 x .909) - 5,000 = Rs. 2272/-. From these calculations it can be seen that NPV of project Y is more than that of project X. Therefore it is advisable to accept project Y.

### 5.4.2.2. Standard Deviation and Coefficient of Variation

The probability assignment approach to risk analysis in capital budgeting does not provide the decision maker, about the variability of cash flows and therefore the risk. To overcome this limitation, standard deviation technique is used. Which is an absolute measure of risk. In case of capital budgeting this measure is used to compare the variability of possible cash flows of different projects from their respective mean. A project having larger standard deviation will be more risky as compared to a project having smaller standard deviation.

The following steps are involved in calculating standard deviation :

- 1) Mean value of possible cash flows is computed.
- 2) Deviations between the mean value and the possible cash flows are found out.
- 3) Deviations are squared.
- 4) Squared deviations are multiplied by the assigned probabilities which give weighted squared deviation.
- 5) The weighted squared deviations are totalled and their square root is found out. The resulting figure is the standard deviation.

Standard deviation is calculated by using the following formula.

$$\sigma_{NPV} = \sqrt{\sum_{i=1}^n (R - \bar{R})^2 p_i}$$

Where :  
 s = standard deviation  
 n = Number of years  
 R = expected cash flows  
 $\bar{R}$  = Mean of the cash flows  
 $p_i$  = probability assignments

**Example : 2** Consider the data given in example I and calculate the standard deviation

**Solution :**

Project : X

Events	Cash inflows (Rs)	(R-R)	(R-R) <sup>2</sup>	Pi	(R-R) <sup>2</sup> Pi
A	4,000	-2,000	40,00,000	0.10	4,00,000
B	5,000	-1,000	10,00,000	0.20	2,00,000
C	6,000	0	0	0.40	0
D	7,000	1,000	10,00,000	0.20	2,00,000
E	8,000	2,000	40,00,000	0.10	4,00,00
<b>Total</b>	<b>30,000</b>				<b>12,00,000</b>

$$R = \frac{\sum R}{N} = \frac{Rs. 30,000}{5} = 6,000$$

Standard Deviation of Project "x" =  $\sqrt{12,00,000} = Rs\ 1,095$

Project : Y

Events	Cash inflows (Rs)	(R-R) R=8000	(R- R) <sup>2</sup>	Pi	(R- R) <sup>2</sup> Pi
A	12,000	4,000	1,60,00,000	.10	16,00,000
B	10,000	2,000	40,00,000	.15	6,00,000
C	8,000	0	0	.50	0.
D	6,000	-2,000	40,00,000	.15	6,00,000
E	4,000	-4,000	1,60,00,000	.10	16,00,000
Total	40,000				44,00,000

$$\bar{R} = \frac{\sum R}{N} = \frac{Rs. 40,000}{5} = Rs. 8,000$$

Standard Deviation of Project y =  $\sqrt{44,00,000} = Rs. 2,098$

The standard deviation of project X is Rs.1,095 where as for the project Y is Rs.2,098. Thus variability of cash flows is more in case of project Y as compared to project X. Hence, project Y is more risky.

### Coefficient of Variation

Coefficient of variation is a relative measure of risk. It is defined as the standard deviation of probability distribution divided by its expected value. Which is calculated as :

$$\text{Coefficient of variation} = \frac{\text{Standard Deviation}}{\text{Expected (mean) value}}$$

Consider the above example and calculate the coefficient of variation.

$$\text{Project x} = \frac{1095}{6000} = 0.1825$$

The coefficient variation of project Y is more as compared to project X. Hence,

$$\text{Project y} = \frac{2098}{8000} = 0.2623$$

Here, the project Y is more risky. Whereas the acceptance of project X or Project Y will depend upon the investor's attitude towards risk. He would prefer project Y if he is ready to bear more risk in order to get higher return. If he has aversion towards risk, he would accept project X as it is less risky.

The coefficient of variation is a useful measure of risk when we are comparing the projects which have

- i) same standard deviation but different expected values, or
- ii) different standard deviations but same expected values, or
- iii) different standard deviations but different expected values.

#### 5.4.2.3. Probability Distribution Approach

In the earlier part of this lesson while dealing with basic concept of risk, the concept of probability was used for incorporating risk in evaluating capital budgeting proposals. The probability distribution of cash flows overtime provides valuable information about the expected value of return and dispersion of the probability distribution of possible returns. On the basis of this information, accept or reject decision can be taken.

#### 5.4.2.4 Independent and Dependent Cash Flows :

The application of the theory in analysing risk in capital budgeting depends upon the behaviour of cash flows. From the point of view of behaviour, cash flows may be

- i) independent or
- ii) dependent.

**Independent Cash Flows :** The assumption is that the cash flows are independent overtime. So that the future cash flows are not affected by cash flows of the preceding years. Thus, the cash flow in year 3 are not dependent on the cash flow of the year 2 and so on.

**Dependent Cash Flows :** When cash flows in one period depend upon the cash flows in previous periods they are referred to as dependent cash flows. Any of the decisions may be dependent on the outcome of preceding or the outcomes of trial. A decision tree is a diagrammatic representation of the relationship among the decision state of nature and pay-offs or outcomes.

#### 5.4.2.5 Decision Tree Analysis:

Decision tree analysis is another technique of analysing the risk involved in capital budgeting proposals. Decision tree is a “graphic display of relationship between a present decision and possible future events, future decisions and their consequences. The sequence of event is mapped out over time in a format similar to the branches of tree”. In other words, it is a pictorial representation in tree form which indicates the magnitude.

The following steps are taken for constructing a decision tree.



- 1) **Define investment** : The first step in constructing decision tree is to define the proposal. For example, entering a new market or introducing new product line.
- 2) **Identify decision alternatives** : The decision alternatives should be clearly identified. For example, a firm may be considering the purchase of new plant for manufacturing a new product. It may have three alternatives (a) Purchases a small plant (b) Purchases a large plant (c) Purchase a medium size plant.
- 3) **Draw a decision tree** : The decision tree is then laid down showing decision point and decision branches.
- 4) **Analyse data** : The results should be analysed and the best alternative should be selected.

### Usefulness of Decision Tree Approach :

The decision tree approach useful in handling the sequential investments the working backwards from future to present, we are able to eliminate unprofitable branches and determine optimum decision at various decision points.

The merits of decision tree are :

- i) It clearly brings out the implicit assumptions and calculations for all to see, question and revise.
- ii) It allows decision maker to visualise assumptions and alternatives in graphic form, which is easier to understand than abstract form.

However, decision tree diagrams can become more complicated as the decision maker decides to include alternatives and more variables and look farther in time. If the analysis is extended to include interdependent alternatives and variables, it becomes more complicated further. So the diagram becomes cumbersome and calculations become very time consuming and difficult.

### Example :3

Suppose a firm has an investment proposal, requiring an outlay of Rs. 20,000/- at present ( $t = 0$ ). The investment proposal is expected to have 2 years economic life with no salvage value. In year 1, there is 0.3 probability that CFAT will be Rs. 8,000/- ; a 0.4 probability that CAFT will be Rs. 11,000/- and a 0.3 probability that CFAT will be Rs. 15,000/-. In year 2, the CFAT possibilities depend on the CFAT that occurs in year 1. That is, the CFAT for the year 2 are conditional on CFAT for year 1. Accordingly the probabilities assigned with the CFAT for the year 2 are conditional probabilities. The estimated conditional CFAT and their associated conditional probabilities are as under :

If CFAT <sub>1</sub> = Rs. 8,000		If CFAT <sub>2</sub> = Rs. 11,000		If CFAT <sub>3</sub> = Rs. 15,000	
CFAT <sub>2</sub> (Rs.)	Probability	CFAT <sub>2</sub> (Rs.)	Probability	CFAT <sub>2</sub> (Rs.)	Probability
4,000	0.2	13,000	0.3	16,000	0.1
10,000	0.6	15,000	0.4	20,000	0.8
15,000	0.2	16,000	0.3	24,000	0.1

Calculate the Net present value (NPV) with the help of a decision tree diagram.

**Solution :**

Time = 0	Year 1		Year 2		Path No.	Expected NPV	Joint Probability (P <sub>j</sub> )	Expected NPV x P <sub>j</sub>
	Probability	CFAT	Probability	CFAT				
Cash Out Lay Rs.20,000	0.3	8,000	0.2	4,000	1	-9,668	0.06	-580
			0.6	10,000	2	-4,886	0.18	-879
			0.2	15,000	3	-901	0.06	-54
	0.4	11,000	0.3	13,000	4	184	0.12	22
			0.4	15,000	5	1,778	0.16	284
			0.3	16,000	6	2,575	0.12	309
	0.3	15,000	0.1	16,000	7	6,147	0.03	184
			0.8	20,000	8	9,335	0.24	2240
			0.1	24,000	9	12,523	0.03	376
							<b>1.00</b>	<b>Rs.1902</b>

Joint Probability = Product of Probabilities of CFAT for years 1 and 2.

The above Decision Tree (DT) covers all dimensions of the problem : i) Timing of the CFAT  
ii) The possible CFAT outcomes in each year and probabilities associated with these outcomes. The DT shows nine distinct possibilities, the project could assumed accepted. For example one possibility is that the CFAT for the 1<sup>st</sup> year may amount Rs. 8,000/- and for the second year Rs. 4,000/-. A close observation of the figure indicates that this is the worst event could happen. Assuming a 12% discount rate, the NPV could be negative in this situation. Likewise, the best outcome that could occur is CFAT<sub>1</sub> = Rs. 15,000/- and CFAT<sub>2</sub> = Rs. 24,000/-. The NPV would be the highest in this situation among all the nine possible combinations.

The expected NPV of the project is given by the following mathematical formula :

$$NPV = \sum_{j=1}^n P_j NPV_j$$

Where

P<sub>j</sub> = probability of j<sup>th</sup> path occurring which is equal to the joint probability along the path.

NPV<sub>j</sub> = NPV of j<sup>th</sup> path occurring.

### 5.5 SUMMARY :

The analysis of risk and uncertainty is an important element in capital budgeting decisions. The term risk refers to the variability of actual return from the expected returns in terms of cash flows.

The risk involved in capital budgeting can be measured in absolute as well as relative terms. The absolute measure of risk includes sensitivity analysis and standard deviation. The coefficient of variation is a relative measure of risk. There are four well recognised methods of calculation of risk in capital budgeting decision framework :

Risk-adjusted discount rate approach (RAD), Certainty equivalent approach (CEA), Probability distribution approach (PDA) and Decision tree approach (DTA).

### 5.6 KEYWORDS :

- Certainty Equivalent** : The return required with certainty to make investors indifferent between the certain return and a particular uncertain return.
- Co-efficient of variation** : A relative measure of variability of the outcomes associated with an event. It is calculated by dividing the standard deviation of a distribution by the mean.
- Decision Tree** : It is an analytical technique to set forth graphically the pattern of relationship between decisions and chance events. It is used to handle risk situations.
- Risk Adjusted Discount Rate** : A discount rate used in capital expenditure decisions that has been adjusted for risk it determines by adding an appropriate risk premium to the risk less rate of return.
- Risk Premium** : It is the difference between expected rate of return on a risky project and the rate of return on a risk less project.
- Sensitivity Analysis** : It is the analysis about the effect of the change in certain variable on an outcome, to estimate the variability of the outcome, or risk associated with a project.

### 5.7 SELF ASSESSMENT QUESTIONS :

- 1) Why do you measure risk ? Explain the types and sources of risk.
- 2) “Risk is measured by the possible variation of outcomes around the expected value” Discuss.
- 3) What makes risk important in the selection of projects ? Explain briefly the various methods of evaluating risky projects ? Can you think of a capital budgeting project that would have perfectly certain returns ?
- 4) What is risk adjusted discount rate ? Explain its Merits and demerits?
- 5) Define the certainty equivalent method. Explain the significance of certainty equivalent method.

- 6) Compare and contrast risk adjusted discount rate and certainty equivalent method.
- 7) “Risk and uncertainty are quite inherent in capital budgeting decisions” comment.
- 8) Explain the concept of sensitivity analysis. How it can take care of risk and uncertainty in capital investment decisions?
- 9) What are the various statistical techniques to handle risk in capital budgeting decisions ? Explain?
- 10) How is risk assessed for a particular investment by using probability distribution ?
- 11) What is Decision Tree? Explain the process of constructing a decision tree. Also explain its merits and demerits.

### 5.8 FURTHER READINGS :

- Pandey I.M. : “Financial Management”, Vikas Publishers, New Delhi
- Khan & Jain : “Financial Management”  
Tata Mc Graw Hill publishing co., New Delhi.
- Maheswari S.N. : “Financial Management”, Sultan Chand and sons,  
New Delhi.
- Van Horne J.C. : “Financial Management and Policy”  
prentice-Hall of India, New Delhi.
- Solomon E. : “Theory of Financial Management”  
Columbia University press, New York.
- Weston J.F. and  
Brigham E.F. : “Managerial Finance”, Holt, Rinehart and Winston
- Prasanna Chandra : ‘Financial Management’ Tata Mc Graw Hill Publishing co  
New Delhi.

## Lesson - 6

# OPERATING LEVERAGE AND BREAK - EVEN ANALYSIS

### OBJECTIVES :

After studying this lesson, you will be able to understand :

- ★ the concept of operating leverage
- ★ technique of break even analysis
- ★ the approaches for determination of break even point
- ★ the assumptions and limitations of break even analysis

### STRUCTURE :

- 6.1 Introduction
- 6.2 Meaning of leverage
- 6.3 Types of leverages
- 6.4 Concept of Break - even analysis
- 6.5 Effect of changes in variables on break - even point
- 6.6 Utility and limitations of break - even analysis
- 6.7 Summary
- 6.8 Key Words
- 6.9 Self - assesment questions
- 6.10 Further readings

#### 6.1 Introduction:

A firm can raise funds for its long - term requirements through equity or debt capital. The use of debt capital for the benefit of shareholders is known as financial leverage. Further, the firm uses assets involving some fixed operating cost that influences the earnings available to equity shareholders. This effect is indicated by operating leverage. In the present lesson, operating leverage and the technique of break - even analysis are explained. In lesson 7 you will have an understanding of financial leverage and EBIT - EPS analysis.

#### 6.2 Meaning of leverage :

The term leverage refers to “an increased means for accomplishing some purpose”. For example, leverage helps us in lifting heavy objects, which may not be otherwise possible. In financial management, the concept of leverage has a special meaning.

Here leverage means the employment of an asset or source of finance which involves some fixed operating cost or fixed return. This fixed cost or fixed return is the fulcrum of leverage. If a firm is not required to pay fixed cost or return, there will be no leverage. Thus, the Leverage influences the earnings of equity shareholders and the risk to them as well. A higher leverage results in higher earnings and greater risk and vice versa.

### 6.3. Types of leverages :

Leverages are of three types 1) Operating Leverage, 2) Financial Leverage 3) Combined/Composite Leverage.

#### 6.3.1. Operating leverage :

Operating leverage refers to the use of fixed costs in the operation of a firm. If the firm's total cost comprises fixed cost which does not change with the volume of output or sales, the operating leverage is said to exist. If there are no fixed costs, there will be no operating leverage.

If a firm has greater amount of fixed costs when compared to variable cost, it will have a higher degree of operating leverage and if the fixed cost is less, it will have a lower degree of operating leverage. Thus, operating leverage increases with fixed cost.

Operating leverage indicates the effects of a change in sales on operating profit, also known as earnings before interest and taxes (EBIT). It is both favorable and unfavorable. A higher operating leverage indicates that even a small change in sales (increase or decrease) will cause a greater change in operating profit.

#### 6.3.2. Measurement of operating leverage :

The existence of fixed costs in the total cost structure of a firm results in operating leverage. Operating leverage is a function of three factors : total fixed cost, contribution and sales volume. Degree of operations leverage is calculated as follows :

$$\text{Operating leverage} = \frac{\text{Contribution}}{\text{Operating profit}} = \frac{\text{Sales} - \text{Variable operating costs}}{\text{EBIT}}$$

#### Illustration 1

From the following information compute operating leverage and comment :

Fixed cost = Rs. 50,000; Variable cost = 70% of sales

Sales : Rs. 2,00,000 in the previous year

Rs. 2,50,000 in the current year



**Solution**

	Previous year Rs	Current year Rs	Percentage change
Sales	2,00,000	2,50,000	25%
Less : Variable cost (70% of sales)	1,40,000	1,75,000	
Contribution	60,000	75,000	
<u>Less</u> : Fixed cost	50,000	50,000	
Operating Profit (EBIT)	10,000	25,000	150%

$$\begin{aligned} \text{Degree of Operating leverage} &= \frac{\text{Contribution}}{\text{EBIT}} \\ &= \frac{60,000}{10,000} = 6 \end{aligned}$$

Comment : The operating leverage of 6 in the above illustration indicates that if sales increase by 1% operating profit shall increase by 6%. Thus, 25% increase in sales has resulted in an increase of 150% in the operating profit.

The degree of operating leverage may also be calculated in a different way. It may be defined as the ratio of percentage change in operating profit to the percentage change in sales. Thus, it is calculated as :

$$\begin{aligned} \text{Degree of operating leverage} &= \frac{\text{Percentage change in operations profits or EBIT}}{\text{Percentage change in sales}} \\ &= \frac{\Delta \text{EBIT}}{\text{EBIT}} \div \frac{\Delta \text{Sales}}{\text{Sales}} \end{aligned}$$

If data from the above illustration is taken, the Degree of operating leverage is as under :

$$\text{DOL} = \frac{150\%}{25\%} = 6$$

**6.3.4. Utility of operating leverage :**

Operating leverage is very useful in ascertaining the effect of a change in sales on operating profit. A high degree of operating leverage indicates that even a small change in sales will have a large effect on EBIT. In other words, a small increase in sales will have larger increase in operating income. This leverage also adversely affects the earnings of the firm. In case of high degree of leverage, even a small fall in sales will result in a greater decrease in operating profit. Since it is very risky, no firm would like to operate under conditions of high degree of operating leverage.



### 6.3.5 Operating Risk

Operating risk is the risk of the firm not being able to cover its fixed operating costs. The larger the magnitude of fixed operating costs the larger is the volume of sales to cover all fixed costs. The higher the fixed operating costs, the higher the degree of operating leverage and the higher the Break even volume. In this context the break even analysis is presented here under.

### 6.4 Concept of Break - Even analysis :

Break - even analysis is a widely used technique to study cost, volume and profit relationships. This is a very useful technique that helps the management of a firm in profit planning. In a narrower sense, break - even analysis refers to the technique used for determining that level of activity where total cost equals total revenue. But in a broader sense, it refers to that technique which determines the probable profit at any level of activity. It portrays the relationship between cost of production, volume of production and selling price. Hence, it is also known as cost volume profit analysis (C-V-P Analysis).

Even though break - even analysis and CVP analysis are interchangeably used, there is a slight difference between the two. CVP analysis is broader and it includes the entire gamut of profit planning, while 'break - even analysis' is a technique used in this process. Hence, CVP analysis is the more appropriate term to be used for studying the CVP relationships. However the term break - even analysis is so popular that these two terms are used as synonymous.

#### 6.4.1. Assumptions of Break - Even analysis :

The technique of break - even analysis is subject to the following assumptions :

1. The total cost can be segregated into fixed and variable components.
2. Total fixed cost remains constant at all levels of output.
3. Variable cost per unit remains constant and total variable cost changes directly in proportion to sales volume.
4. Selling price per unit remains unchanged at all levels of output.
5. The firm produces, only one product or in case of multiple products, the sales - mix remains constant.
6. There is synchronisation between production and sales. It means that there will be no opening or closing stock.

#### 6.4.2. Meaning of Break - Even point and its Determination :

The break - even point may be defined as that level of sales volume at which total revenue is equal to total cost. It is a point of no profit or no loss. At this point of sales, the firm's total revenue breaks evenly with total cost, and hence the name. Any increase in sales beyond this point will fetch profits to the firm and if sales fall below this point, the firm will incur loss. Thus, the break - even point is:

$$\text{Sales revenue} = \text{When Total Variable cost} + \text{Total fixed cost}$$

There are two approaches to compute the break - even point

- a) Algebraic Formula Approach, and
- b) Graphic or Chart Approach

**a) The Algebraic formula approach :**

By using algebraic formula, the break - even point can be computed, i) in terms of units of sales volume ii) in terms of money value of sales volume, and iii) as a percentage of estimated capacity.

If

F	=	Total fixed costs
V	=	Variable cost per unit
P	=	Price per unit
Q	=	quantity sold
TR	=	total revenue
TC	=	Total cost

Then

TR	=	Price per unit x quantity sold = P.Q
TC	=	Total variable cost + Total fixed cost
	=	{ Variable cost per unit x quantity sold } + Total

If

F	=	Total fixed costs
V	=	Variable cost per unit
P	=	Price Per unit
Q	=	Quantity sold
TR	=	Total revenue
TC	=	Total Cost

Then

TR	=	Price per unit X Quantity Sold P.Q
TC	=	Total Variable cost + Total Fixed Cost
	=	(Variable cost per unit X Quantity sold) + total fixed cost
	=	V.Q + F

at the break even point of sales total revenue is equal to total cost therefore

TR	=	TC
P.Q	=	V.Q + F
PQ - VQ	=	F

$$Q [P-V] = F$$

$$Q = \frac{F}{P-V} = \frac{F}{C}$$

Here, Q is the break even sales

F is the total Fixed cost

P is the Price per unit

V is the Variable cost per unit

C is the Contribution per unit

### i) Break - Even point (in units) :

Break - even point is a point of no profit or no loss. It can be calculated with the help of the following formula:

$$\text{Break - even point (in units)} = \frac{\text{Fixed cost}}{\text{Contribution per unit}}$$

Where, contribution per unit = Selling price per unit - Variable cost per unit

Since total contribution is equal to total fixed cost at break - even point, fixed cost is divided by contribution per unit to get the break - even point in units.

### ii) Break - Even point (in rupees) :

Break - even point in rupee value can be calculated with the help of following formula :

$$\text{a) Break - even point (in rupees)} = \frac{F}{P-V} = P$$

Where, F = Fixed cost

P = Selling price per unit

V = Variable cost per unit

b) Break - even point can also be calculated as follows

$$\text{Break - even point (in rupees)} = \frac{\text{Fixed cost}}{\text{P/V Ratio}}$$

Where, P/V Ratio

It is a ratio between contribution and sales. Which is also known as contribution ratio. This ratio indicates the extent to which sales will contribute to meet fixed cost up to break - even point and to total profit of the firm after break - even point. It is calculated as :



$$P/V \text{ Ratio} = \frac{P - V}{P} \times 100 \text{ or } \frac{C}{P} \times 100$$

Where, P = Price, V = Variable cost  
C = P - V = Contribution

Since, C = P - V and  $\frac{V}{S}$  represents variable cost to sales ratio, the P/V ratio can also be calculated as below :

$$P/V \text{ Ratio} = 1 - \frac{V}{P} \text{ or } 1 - \text{Variable cost ratio.}$$

Thus, if variable cost ratio is 60% or .6, then P/V ratio will be 40% or .4.

### Illustration 2 :

Calculate the break - even point in units and in sales value from the following data :

Sales	=	3000 units
Selling price per unit	=	Rs. 30
Variable cost per unit	=	Rs. 20
Fixed cost	=	Rs. 20,000

Solution :

$$\text{Break - even point (in units)} = \frac{\text{Fixed cost}}{\text{Selling Price per unit} - \text{Variable cost per unit}}$$

$$= \frac{\text{Rs } 20,000}{\text{Rs } 30 - 20}$$

$$= \frac{\text{Rs } 20,000}{10} = 2000 \text{ Units}$$

$$\text{Break - even point in rupees} = \frac{\text{Fixed cost}}{S - V} \times S \quad \text{Where } S = \text{Selling price per unit}$$

V = Variable cost per unit

$$\begin{aligned} \therefore \text{Break - even sales} &= \frac{\text{Rs } 20,000}{30 - 20} \times 30 \\ &= \text{Rs. } 60,000 \end{aligned}$$

$$\begin{aligned}
 \text{Alternately, Break - even sales} &= \text{Break - even point units} \times \text{selling price} \\
 &= 2000 \text{ units} \times \text{Rs } 30 \\
 &= \text{Rs } 60,000
 \end{aligned}$$

### iii) Break - Even point as a percentage of estimated capacity :

Break - even sales can also be expressed as a percentage of estimated capacity of the firm. It is calculated as :

$$\text{Break - even point (as percentage of capacity)} = \frac{\text{Break - even sales}}{\text{Estimated capacity}} \times 100$$

#### Illustration 3 :

Total estimated capacity = 1,00,000 units,

Break - even point = 60,000 units, then find out

break - even point as percentage of estimated capacity.

#### Solution :

$$\begin{aligned}
 \text{Break - even point (as percentage of capacity)} &= \frac{\text{Break - even point}}{\text{Estimated capacity}} \times 100 \\
 &= \frac{60,000 \text{ units}}{1,00,000 \text{ units}} \times 100 \\
 &= 60\%
 \end{aligned}$$

### b) Graphic or Chart Approach :

The break - even point can also be shown graphically. A break - even chart portrays a pictorial view of the relationship between costs, volume and profits. The break - even chart shows that the break - even point occurs where the total cost line and total revenue, line intersect each other. This chart also shows not only the break - even point but also the profit or loss at various levels of sales.

The break - even chart is drawn by following the steps given below :

1. Volume of output sales (units or rupees) is presented on horizontal axis or x- axis
2. Costs and sales revenue are plotted on vertical or y- axis
3. Fixed cost line is drawn parallel to x-axis as fixed costs remain constant at all levels of activity.
4. Total cost line is drawn starting at fixed cost line touching the y- axis
5. Total revenue line is drawn starting at the origin of the two axes.

The mechanism of constructing the break - even chart can be illustrated by using the following data :

Price Per unit = Rs 2

Variable cost : Rs 1.20

Fixed cost = Rs 40,00,000

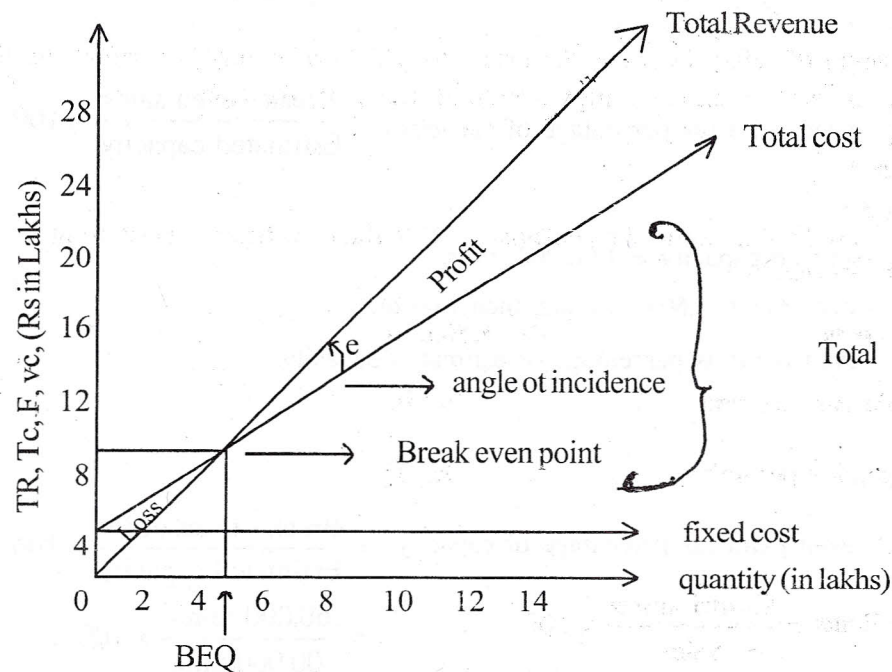


Fig. 6.1 Break Even Chart

Fig.1 shows that the break even point occurs at the point of intersection between total revenue and total cost lines. The break - even point for the above firm occurs at sales level of Rs. 5 Lakhs Units. The area to the left of the break - even point represents loss zone and the area to the right represents profit zone.

**Angle of Incidence :** The angle formed at the point of intersection between total cost line and total sales line is known as the angle of incidence. This angle is significant because it gives us an idea about the profitability of the firm after break - even point. If this angle is larger, the break - even point will be lower and the profitability will be greater after break - even point and vice versa.

**Margin of safety :**

The excess of actual or budgeted sales over the break - even sales is known as the margin of safety. In the above illustration, margin of safety is 5 lakh units, if actual sales is 10 lakh units.

The margin of safety can be expressed as a percentage of sales :

$$\begin{aligned} \text{Margin of safety} &= \frac{\text{actual sales} - \text{Break-even sales}}{\text{Total sales}} \times 100 \\ &= \frac{10,00,000 - 5,00,000}{10,00,000} \times 100 \\ &= 50\% \end{aligned}$$

The margin of safety indicates the extent to which sales may fall before the firm incurs a loss. A high margin of safety indicates a high degree of safety for the firm.

### Illustration 1

From the following particulars, calculate i) P/V Ratio ii) Break - even point (in units), and iii) Break - even point (in rupees.)

Fixed costs	:	Rs. 1,50,000
Variable cost per unit	:	Rs.10
Selling price per unit	:	Rs. 15

### Solution :

$$\text{i) P/V Ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100$$

$$\begin{aligned} \text{Contribution} &= \text{Selling price} - \text{Variable cost per unit} \\ &= \text{Rs } 15 - \text{Rs } 10 = \text{Rs } 5 \end{aligned}$$

$$\therefore \text{P/V Ratio} = \frac{\text{Rs. } 5}{\text{Rs. } 15} \times 100 = 33\frac{1}{3}\%$$

$$\begin{aligned} \text{ii) Break - even point in units} &= \frac{\text{Fixed cost}}{\text{Contribution per unit}} \\ &= \frac{\text{Rs. } 1,50,000}{\text{Rs } 5} \\ &= 30,000 \text{ Units} \end{aligned}$$

$$\text{iii) Break - even point (in rupees)} = \frac{\text{Fixed cost}}{\text{P/V Ratio}}$$



$$= \frac{\text{Rs. } 1,50,000}{33\frac{1}{3}\%} = 4,50,000$$

**Illustration 2**

From the following particulars calculate :

- 1) Break - even point
- 2) Margin of safety
- 3) Sales required to earn a profit of Rs. 1,50,000
- 4) Profit when sales are of Rs. 10,00,000
- 5) Margin of safety available, if the company is earning a profit of Rs. 2,00,000

Fixed costs	:	Rs. 1,50,000
Profit	:	Rs. 1,00,000
Sales	:	Rs. 5,00,000

**Solution :**

$$1) \text{ Break - even point (in rupees)} = \frac{\text{Fixed cost}}{\text{P/V Ratio}}$$

$$\text{P/V Ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100$$

$$\begin{aligned} \text{Contribution} &= \text{Fixed cost} + \text{Profit} \\ &= 1,50,000 + 1,00,000 = 2,50,000 \end{aligned}$$

$$\therefore \text{P/V Ratio} = \frac{2,50,000}{5,00,000} \times 100 = 50\%$$

$$\begin{aligned} \text{Hence, break - even point} &= \frac{\text{Rs. } 1,50,000}{50\%} \text{ or } \frac{1,50,000}{50} \\ &= \text{Rs } 3,00,000 \end{aligned}$$

$$\begin{aligned} 2) \text{ Margin of safety} &= \text{Total sales} - \text{Break - even sales} \\ &= \text{Rs } 5,00,000 - \text{Rs } 3,00,000 \\ &= \text{Rs. } 2,00,000 \end{aligned}$$

$$3) \text{ Sales required to earn a profit of Rs. } 1,50,000$$

$$\text{Sales to earn targeted profit} = \frac{\text{Fixed cost} + \text{Target profit}}{\text{P/V Ratio}}$$

$$\begin{aligned} &= \frac{\text{Rs. 1,50,000} + 1,50,000}{50\%} \\ &= \frac{\text{Rs. 3,00,000}}{50} \times 100 \\ &= \text{Rs 6,00,000} \end{aligned}$$

4) Profit when sales are Rs. 10,00,000

$$\begin{aligned} \text{Profit} &= (\text{Sales} \times \text{P/V Ratio}) - \text{Fixed cost} \\ &= (\text{Rs } 10,00,000 \times \frac{50}{100}) - \text{Rs. 1,50,000} \\ &= \text{Rs } 5,00,000 - \text{Rs. 1,50,000} \\ &= \text{Rs. 3,50,000} \end{aligned}$$

5) Margin of safety when profit is Rs. 2,00,000

$$\begin{aligned} \text{Margin of safety} &= \frac{\text{Profit}}{\text{P/V Ratio}} \\ &= \frac{\text{Rs. 2,00,000}}{50} \times 100 \\ &= \text{Rs. 4,00,000} \end{aligned}$$

### Illustration 3

The following figures of sales and profits for two periods are available in respect of a firm :

	Sales	Profit
Period I	1,00,000	15,000
Period II	1,20,000	23,000

You are required to calculate :

- P/V Ratio
- Break - even point
- Sales required to earn a profit of Rs. 20,000
- Profit at estimated sales of Rs. 1,50,000
- Margin of Safety at a profit of Rs 50,000

**Solution :**

$$\begin{aligned} \text{a) P/V Ratio} &= \frac{\text{Change in profits}}{\text{Change in Sales}} \times 100 \\ &= \frac{23,000 - 15,000}{1,20,000 - 1,00,000} \times 100 \\ &= \frac{8000}{20,000} \times 100 = 40\% \end{aligned}$$

$$\text{b) Break - even point} = \frac{\text{Fixed cost}}{\text{P/V Ratio}}$$

As fixed cost is not given, it should be computed. Take data of one period and calculate the fixed cost in the following manner.

$$\text{Profit} = (\text{Sales} \times \text{P/V Ratio}) - \text{Fixed cost}$$

$$\begin{aligned} \therefore \text{Fixed cost} &= (\text{Sales} \times \text{P/V Ratio}) - \text{profit} \\ &= (1,00,000 \times 40\%) - 15,000 \\ &= 40,000 - 15,000 = 25,000 \end{aligned}$$

$$\begin{aligned} \therefore \text{Break - even point} &= \frac{\text{Rs. } 25000}{40\%} \\ &= \frac{25000}{40} \times 100 \\ &= \text{Rs. } 62,500 \end{aligned}$$

c) Sales required to earn a profit of Rs. 20,000

$$\begin{aligned} \text{Sales for targeted profit} &= \frac{\text{Fixed cost} + \text{Desired profit}}{\text{P/V Ratio}} \\ &= \frac{\text{Rs } 25,000 + 20,000}{40\%} \\ &= \frac{45,000}{40} \times 100 = \text{Rs. } 1,12,500 \end{aligned}$$

d) Profit when sales are Rs. 1,50,000

$$\text{Profit} = (\text{sales} \times \text{P/V Ratio}) - \text{Fixed cost}$$

$$\begin{aligned}
 &= (1,50,000 \times \frac{40}{100}) - 25,000 \\
 &= 60,000 - 25,000 \\
 &= \text{Rs. } 35,000
 \end{aligned}$$

e) Margin of safety at a profit of Rs. 50,000

$$\text{Margin of safety} = \frac{\text{Profit}}{\text{P/V Ratio}}$$

$$= \frac{50,000}{40\%} = \text{Rs. } 1,25,000$$

### 6.5 Effect of changes in Fixed cost :

Break - even point of a firm are is affected by the changes in fixed cost.

An Uncrease is Fieed cost results is the lercrase of break even point. The minimum quantity required to recover all costs rises

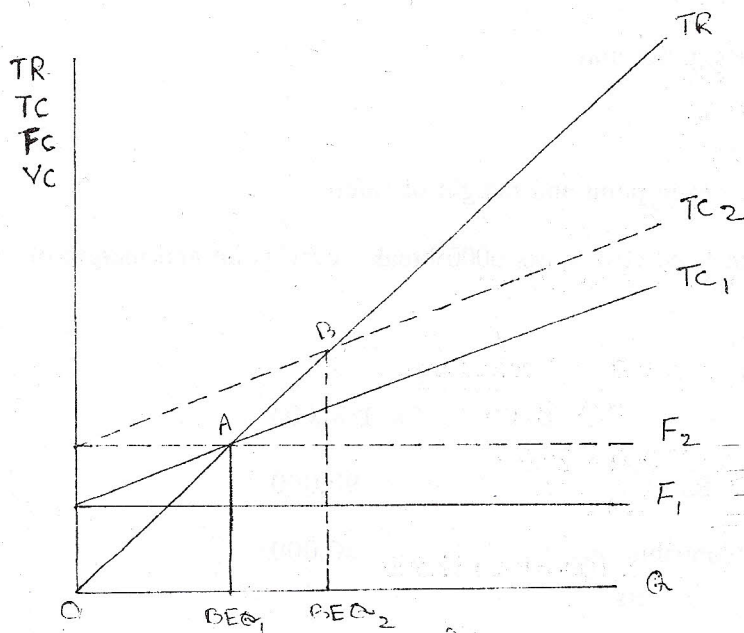


Fig: 6.2. Effect of change in fixed cost

In Fig 6.2  $TC_1$  is the initial total cost,  $TR$  is the total revenue and  $BEO_1$  is break even quantity when fixed cost is  $F_1$ .

When fixed cost increased from  $F_1$  to  $F_2$  the total cost curve shifted from  $TC_1$  to  $TC_2$ . Break even point moved to point 'B' from 'A'. Break even quantity increased from  $BEO_1$  to  $BEO_2$ .

Similarly, if fixed cost decreased from  $F_2$  to  $F_1$  the total cost curve shifts from  $TC_2$  to  $TC_1$  moving the break even point to  $BEO_1$  from  $BEO_2$ .

### Effect of changes in fixed costs :

A change in fixed costs does not affect P/V ratio. Other factors remaining constant, a decrease in fixed costs will lower the break - even point and raise the profits. On the other hand, an increase in fixed costs will result in a higher break - even point and lower amount of profits.

The effect of the changes in these factors can be shown with the help of the following illustration:

### Illustration 4 :

ABC Ltd has prepared the following budget estimates for the year 2003 - 2004 :

Sales	:	15,000 units
Fixed expenses	:	Rs. 34,000
Sales	:	Rs. 1,50,000
Variable costs	:	Rs. 6 per unit

### You are required to :

- find out the P/V Ratio, break - even point and margin of safety.
- Show the effect of increase in fixed cost by Rs 6000 break - even point and margin of safety :

### Solution :

i) When the  $F = Rs 34,000$

Sales	:	Rs. 1,50,000
Less Variable cost (15000 x Rs 6)	:	90,000
Contribution	:	60,000

Rs

Price per unit	:	10
Less Variable cost per unit	:	6
Contribution per unit	:	4



$$\begin{aligned}\text{Break even quantity} &= \frac{F}{P - V} \\ &= \frac{34000}{10 - 6} \\ &= 8500 \text{ Units}\end{aligned}$$

$$\begin{aligned}\text{Margin of Safety} &= \text{Actual Sales} - \text{Break Even Sales} \\ &= 15000 - 8500 \\ &= 6500 \text{ units}\end{aligned}$$

(ii) when F increases by Rs 6000

$$\text{BEQ} = \frac{40000}{4} = 10,000 \text{ Units}$$

$$\begin{aligned}\text{Margin of Safety} &= \text{Actual Sales} - \text{Break even Sales} \\ &= 15000 - 10000 \\ &= 5000 \text{ units}\end{aligned}$$

When the fixed cost increased from Rs 34000 to Rs 40000 the break even point also rose from 8500 units to 10,000 units. The margin of safety decreased from 6500 units to 5000 units similarly, if fixed cost decreases from Rs 40,000 to Rs 36000, break even quantity decreases from 10000 units to 8500 units.

### 6.6 Utility and limitations of Break - Even analysis :

Break - even analysis is a very useful technique of profit planning and control for managers. It has the following advantages.

- 1) It is a simple technique to understand the accounting data for those business executives who are unable to understand financial statements.
- 2) It helps the management in identifying causes of increasing break - even point and falling profits and the measures to be taken
- 3) It provides the basic information that enables the management to further investigate the ways for profit improvement.
- 4) It helps in considering the risk implications of alternative actions of profit planning.

#### Limitations :

Break - even analysis is a useful technique which helps the management in its profit planning. But, it is based on certain assumptions which limit the utility and the applicability of this technique. These limitations should be considered while using this technique to get meaningful results. The CVP analysis suffers from the following limitations :



- 1) One important assumption of break - even analysis is that costs can be separated into fixed and variable components. But this classification is not always possible. Most of the expenses belong to mixed category.
- 2) Total fixed costs do not remain constant at different level, of output. In practice, they are constant over a relevant range of output and would increase in a step - wise fashion.
- 3) The assumption of a constant variable cost per unit is unrealistic. Total variable costs do not change proportionately to output.
- 4) The assumption of a constant selling price may be valid under conditions of perfect competition. But under imperfect market conditions selling price should be reduced to sell more units of output.
- 5) The break - even analysis is best suited for a single product firm. But it is difficult to use this technique for a multi - product firm. The break - even point for a multi - product firm as a whole is valid only if the sales mix is constant.
- 6) The break - even analysis is short - term technique of profit planning and has a limited use in long - range planning.
- 7) The break - even analysis is a static tool. It shows the relationship between costs, volume and profit of a firm at a given point of time assuming that costs and sales to be static.

### 6.7 Summary :

In financial management, leverage refers to the employment of an asset or source of funds for which the firm pays a fixed cost or return. Leverages are of three types - operating leverage, financial leverage and composite leverage.

Operating leverage refers to the use of fixed costs in the operation of a firm and indicates the effect of a change in sales on EBIT.

Break - even analysis or CVP analysis shows the relationship between costs, volume and profit. Break - even point is that level of activity or volume of output at which there is no profit or loss. Break - even analysis is a very useful technique to help the management in profit planning. In spite of its limitations, it is a very popular technique in ascertaining cost, volume and profit relationships.

### 6.8 Key words :

**Leverage :** The employment of an asset or source of funds for which a fixed cost or return paid.

**Operating leverage :** The existence of fixed costs in the cost structure of the firm.

**Degree of operating leverage :** The percentage change in operating income in response to a percentage change in sales

**Break - even point :** The level of activity or output at which there is no profit or loss.

**P/V Ratio :** A ratio between contribution and sales.



## LESSON - 7

**FINANCIAL LEVERAGE AND COMBINED LEVERAGE****Objectives**

The main objectives of this lesson are to explain

- \* the concept of financial leverage, its measurement and importance
- \* the EBIT-EPS analysis
- \* the point of indifference
- \* the meaning and measurement of composite leverage

**STRUCTURE :**

- 7.1 Meaning of Financial Leverage**
- 7.2 Measurement of Financial Leverage**
- 7.3 Financial Leverage and EBIT - EPS Analysis**
- 7.4 Calculation of Point of Indifference**
- 7.5 Combined Leverage - Meaning and Measurement**
- 7.6 Importance of Financial and Operating Leverages**
- 7.7 Summary**
- 7.8 Key Words**
- 7.9 Self - Assessment Questions**
- 7.10 Further Readings**

**7.1 Meaning of Financial Leverage :**

The composition of different sources of long-term funds mobilised by a firm is known as capital structure of that firm. These sources include debt, preference capital, equity and retained earnings. The use of fixed income bearing debt and preference share capital along with equity for the benefit of owners of the firm (equity shareholders) is called financial leverage or trading on equity. Since the cost of these funds is fixed and cheaper when compared to cost of equity, their use magnifies the earnings to the equity shareholders.

**Favourable and Unfavourable Financial Leverage :** Financial leverage can be favourable or unfavourable. Debt capital involves payment of interest at a fixed rate irrespective of the fact that the firm makes profit or not. The preference dividend, however, is payable out of after-tax income. If there is no profit during any particular year, the preference dividend is not payable. The equity shareholders are entitled to the residual income. A firm is said to have a favourable financial leverage, if its earnings are more than the cost of debt and preference capital. On the contrary, if it does not earn as much as these costs, the leverage is unfavourable.

**Financial Leverage and Trading on Equity :** Financial leverage and trading on equity are generally synonymously used. However, there is a slight difference to be shown in their use. Trading on equity refers to the employment of fixed income - bearing sources of funds for the benefit of equity shareholders. Hence, the term trading on equity should be used for financial leverage only when it is favourable. The firm resorts to trading on equity with the objective of giving the equity shareholders a higher rate of return than the general rate of return on the capital employed in the firm, so that it may compensate the risk they bear.

For example, if a firm borrows debt capital at 15% and earns 20% on its capital, the difference of 5% after payment of interest belongs to equity shareholders making their total return 25% (20+5). On the other hand, if the firm earns only 12% on its capital, there will be a loss of 3% after payment of interest, which makes the rate of return available to equity shareholders lower at 9% (12-3). Thus, financial leverage is a double-edged sword, which has the potentiality of increased return as well as increased risk to equity shareholders.

## 7.2 Measurement of Financial Leverage

Degree of Financial Leverage can be calculated with the following formula :

$$\text{Degree of Financial Leverage} = \frac{EBIT}{EBT} = \frac{EBIT}{EBIT - I}$$

Where,

EBIT = Operating profit or Earnings before interest and tax

EBT = Earnings before tax

I = Annual Interest on debt capital

### Illustration 1

Calculate the financial leverage for the following financial plan

Equity capital = Rs. 2,00,000

Debt = Rs. 2,00,000

Operating profit = Rs. 40,000

(EBIT)

Interest at 10% on debt capital.

### Solution :

EBIT = Rs. 40,000

Less Interest @10% on debt = Rs. 20,000

EBT = Rs. 20,000

$$\begin{aligned} \text{Degree of Financial Leverage} &= \frac{EBIT}{EBT} = \frac{Rs. 40000}{Rs. 40000 - 20000} \\ &= \frac{40,000}{20,000} = 2 \end{aligned}$$

**Alternative Definition of Financial Leverage :** One of the objectives of planning an appropriate capital structure is to maximise the return on equity shareholders' funds or maximise the earnings 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 earnings per share. Therefore, financial leverage indicates the percentage change in EPS in relation to a percentage change in EBIT.

As per the above definition the degree of financial leverage can be calculated as below :

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

It is implied that there will be no financial leverage, if the quotient according to the above formula does not exceed one.

**Illustration 2**

A company has the following capital structure :

10,000 Equity shares of Rs. 10 each	:	Rs. 1,00,000
2,000 10% Preference shares of Rs. 100 each:		Rs. 2,00,000
2,000 10% Debentures of Rs. 100 each :		Rs. 2,00,000

Calculate the EPS for each of the levels of EBIT as : i) Rs. 1,00,000 and ii) Rs. 1,40,000.

Also calculate the financial leverage taking EBIT level under base (i). Tax rate is 50%.

**Solution :** Computation of Earnings per share

	(i)	(ii)
EBIT	Rs. 1,00,000	Rs. 1,40,000
Less : Interest on debentures	<u>20,000</u>	<u>20,000</u>
EBT	80,000	1,20,000
Less Tax @50%	<u>40,000</u>	<u>60,000</u>
EAT	40,000	60,000
Less : Preference dividend	<u>20,000</u>	<u>20,000</u>
Earnings available to equity shareholders	<u>20,000</u>	<u>40,000</u>
Earnings per share	Rs. 2	Rs. 4

$$\text{EPS} = \frac{\text{Earnings available to equity shareholders}}{\text{No. of equity shares}}$$

$$\text{Degree of financial leverage} = \frac{\text{Percentage Change in EPS}}{\text{Percentage change in EBIT}} = \frac{100\%}{40\%} = 2.5$$

**7.3 Financial Leverage and EBIT - EPS Analysis**

Financial leverage is used to magnify the shareholder's earnings. It is based on the assumption that cost of fixed charge funds is lower than the firm's rate of return on its assets. An analysis of EBIT - EPS relationships helps in designing the capital structure of a firm. It is a widely used technique to design an appropriate capital structure which will be determined on the basis of EPS. It will help to determine the appropriate financial plan from among various alternative financial plans, when EBIT is constant and is varying. This EBIT - EPS can be explained with the following illustrations :

**7.3.1 Analysing Alternative Financial Plans - Constant EBIT :** The effect of financial leverage on EPS under various alternative financial plans can be illustrated as below.

**Illustration 3**

ABC Ltd. has an equity share capital of Rs. 10,00,000 divided into shares of Rs. 100 each. The company plans to raise further Rs. 5,00,000 for expansion-cum-modernisation. The company has the following financial plans :

Plan I :	All common stock
Plan II :	Rs. two lakh in equity and Rs. 3 lakh in 8% debt.
Plan III :	All debt financed at 8% p.a.
Plan IV :	Rs 2 lakh in equity and Rs. 3 lakh in 8% preference share capital.

The Company's present earnings before interest and tax (EBIT) are Rs. 3,00,000. The corporate tax rate is 50%.

You are required to calculate the earnings per share in each plan and comment on the implications of financial leverage.

**Solution :**

	Different PLANS			
	I (Rs.)	II (Rs.)	III (Rs.)	IV (Rs.)
Earnings before interest and taxes (EBIT)	3,00,000	3,00,000	3,00,000	3,00,000
Less : Interest @ 8%	-	24,000	40,000	-
EBT	3,00,000	2,76,000	2,60,000	3,00,000
Less : Tax @ 50%	1,50,000	1,38,000	1,30,000	1,50,000
EAT	1,50,000	1,38,000	1,30,000	1,50,000
Less : Preference dividend @ 8%	-	-	-	24,000
Earnings available to equity shareholders	1,50,000	1,38,000	1,30,000	1,26,000
No. of equity shares	15,000	12,000	10,000	12,000
Earnings per share (EPS)	Rs. 10	Rs. 11.50	Rs. 13	Rs. 10.50

**Comments :**

Of all the above financial plans, plan III, the most leveraged is the best plan as its EPS is the highest at Rs. 13. Plan II is the next best plan where the EPS is Rs. 11.50. In this case, Rs. 3 Lakh are mobilised in the form of debt capital. Even plan IV, where preference Capital is mobilised, is better than plan I which is all-equity financed.

Thus, through EBIT-EPS analysis, alternative financial plans can be assessed.

**7.3.2 Analysing Alternative Financial Plans - Varying EBIT**

In practice, EBIT for any firm is subject to various influences. As a result, EBIT varies. In the given period, the actual EBIT of the firm may be more or less than the expected. It is therefore useful to analyse the impact of financial leverage on EPS for possible fluctuations in EBIT. It is illustrated below :

**Illustration 4**

A firm is considering two financial plans for an investment of Rs. 5,00,000

	<i>Plan I</i>	<i>Plan II</i>
Debt (at 10% interest)	Rs. 4,00,000	Rs. 1,00,000
Equity share capital (Rs. 10 each)	Rs. 1,00,000	Rs. 4,00,000
Total Capital	Rs. 5,00,000	Rs. 5,00,000
No. of equity shares	10,000	40,000

Find out the effect of financial leverage on EPS, if EBIT expected is i) Rs. 50,000, ii) Rs. 75,000, and iii) Rs. 1,25,000. The corporate tax rate is 50%.



**Solution :**

Effect on EPS under Plan I

	<u>Rs.</u>	<u>Rs.</u>	<u>Rs.</u>
EBIT	50,000	75,000	1,25,000
Less : Interest on debt	<u>40,000</u>	<u>40,000</u>	<u>40,000</u>
Earnings before tax :	10,000	35,000	85,000
Less : tax @ 50%	<u>5,000</u>	<u>17,500</u>	<u>42,500</u>
Earnings after tax :	<u>5,000</u>	<u>17,500</u>	<u>42,500</u>
No. of equity shares	10,000	10,000	10,000
Earnings per share :	0.50	1.75	4.25

Effect on EPS under Plan II

	<u>Rs.</u>	<u>Rs.</u>	<u>Rs.</u>
EBIT	50,000	75,000	1,25,000
Less : Interest	<u>10,000</u>	<u>10,000</u>	<u>10,000</u>
EBT	40,000	65,000	1,15,000
Less Tax @ 50%	20,000	32,500	57,500
EAT	<u>20,000</u>	<u>32,500</u>	<u>57,500</u>
No. of equity shares :	40,000	40,000	40,000
Earnings per share (EPS)	0.50	0.81	1.44

**Comment :**

- Plan I more leveraged than plan II. Plan I has 80% of debt while plan II has only 20% of debt capital.
- Under plan I, the effect of change in EBIT on EPS is more when compared to plan II, because financial leverage is higher in plan I.

**7.4 Calculation of Indifference point**

The point of indifference refers to that level of earnings before interest and taxes (EBIT), at which earnings per share (EPS) remains the same irrespective of different alternatives of debt-equity mix. At this level of EBIT, the rate of return on capital employed is equal to the cost of debt. This is also known as break-even level of EBIT for alternative financial plans.

At the level of indifference EBIT (EBIT\*) alternative financial plans with result in the same EPS. For example

- a) Under all equity (100%) plan, EPS is equal to

$$EPS_a = \frac{EBIT(1-T)}{N_a} \quad \text{Where EBIT = Earning Before Interest and Taxes.}$$

T = corporate tax rate  
N = Number of shares

- b) Under Debt - Equity plan, EPS is equal to

$$EPS_b = \frac{(EBIT - I)(1-T)}{N_b} \quad \text{Where I = annual interest}$$

- c) Under Debt - Equity - preference capital plan EPS is equal to

$$EPS_c = \frac{(EBIT - I) (1-T) - D_p}{N} \quad \text{Where } D_p = \text{Preference Dividend}$$

If we wish to find the indifference level of EBIT between plan a (all equity) and plan b (Debt - Equity), since EPS under both plans would to equal at Indifference level of EBIT, EBIT \* can be worked out by the following procedure

Since  $EPS_a = EPS_b$

$$\text{then} = \frac{EBIT (1-T)}{N} = \frac{(EBIT - I) (1-T)}{N}$$

- Given
- i) number of shares under both the plans (H)
  - ii) interest on debt (I)
  - iii) corporate tax rate (T)

We can solve EBIT which is the indifference level of EBIT (EBIT \*)

Similarly between financial plan d and c the following equation can be used.

- Given
- i) Interest under both plans (I)
  - ii) Tax rate (T)
  - iii) Number of shares under both plans
  - iv) Preference dividend under plan c (DP)

we can solve EBIT by using the following equation.

$$\frac{EBIT - I_b) (1-T) (EBIT - I_e) (1-T)-D_p}{N_b} = \frac{\quad}{N_c}$$

### 7.4.1. EBIT - EPS Analysis - Graphical Presentation :

We know that

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

if the equation is rearranged

$$EPS = \frac{(1 - T)EBIT}{N} - \frac{(1 - T)I}{N} - \frac{DP}{N}$$

$$EPS = \frac{-(1 - T)I}{N} - \frac{DP}{N} + \frac{(1 - T)}{N} EBIT$$

When the level of leverage, corporate the rate and dividend on preference Capital are constant.

$$\left[ \frac{(1 - T)I}{N} + \frac{DP}{N} \right] \text{ is a constant}$$

Then EBIT is a changing variable and is represented by 'x'

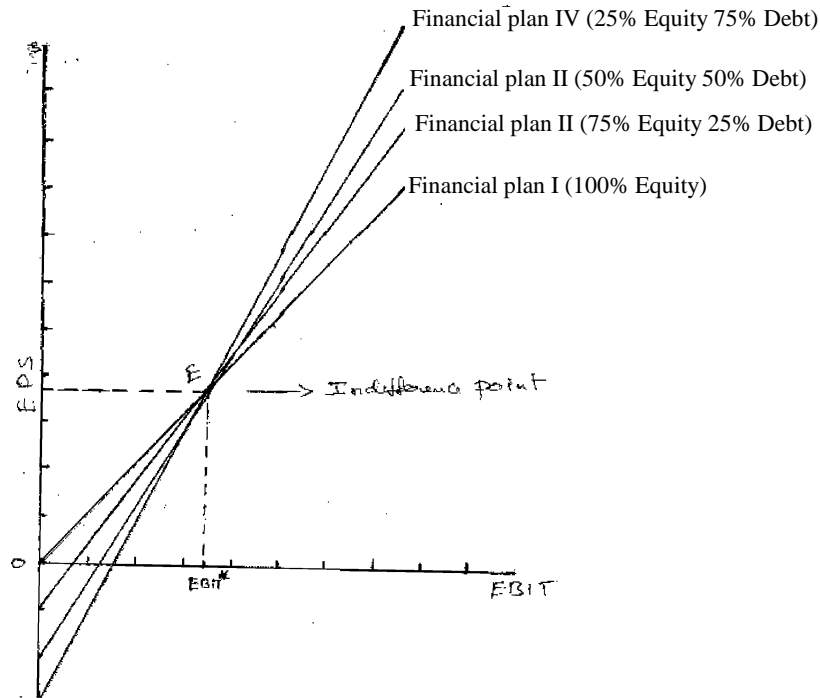
$$EPS = - \left[ \frac{(1 - T)I}{N} + \frac{DP}{N} \right] + \left[ \frac{1 - T}{N} \right] EBIT$$

if EPS is represented by y

then  $y = a + bx$

Therefore EPS is a linear function of EBIT.

If  $H_0$  EBIT - EPS relationship is plotted on a graph the line takes the shape of a straight line



from the graphical view of EBIT - EPS analysis the following observations can be made.

- \* The line become steeper and steeper with more and more debt in the capital structure
- \* Steeper the line, the more the profit potential to the shareholders
- \* Point of intersection (E) is the indifference point. It is the level of EBIT at which EPS under various alternative financial plans is equal. It is the point where rate of
- \* Below the indifference point, the line shifts more and more towards the right when the level of leverage increases, indicating Unfavourable effect of leverage.
- \* The line beyond point E shifts towards left as the leverage increases indicating favourable effect of leverage.

If the actual EBIT of the company is

- \* Lower than EBIT\* - Equite financing is preferable
- \* equal to EBIT\* - all plans are equally preferable
- \* More than EBIT\* - Debt financing is preferable

These situations arise because of the difference between rate of return on assets (r) and rate of interest on debt (i)

r is less than i	-	EPS decreases with every increase in debt
r is equal to i	-	EPS remains the same with any level of debt
r is more than i	-	EPS increases with increasing debt

**Illustration 5 :**

A new project under consideration of a company requires an investment of capital of Rs. 150 lakhs. Interest on term loan is 12% and the tax rate is 50%. If the debt equity ratio insisted by the financing agencies is 2:1, calculate the point of indifference for the project.

**Solution :**

In case of this project, the financing agencies insisted on debt - equity ratio of 2:1. Hence, there are two alternative plans they are :

- 1) Raising the entire amount of Rs. 150 lakhs by the issue of equity shares, so that there is no debt.
- 2) Raising debt capital of Rs. 100 lakhs and equity capital of Rs. 50 lakhs.

Calculation of point of indifference :

$$\frac{(X - I_1) (I - T) - D_p}{N_1} = \frac{(X - I_2) (I - T) - D_p}{N_2}$$

$$\frac{(X - 0) (1 - .5) - 0}{150 \text{ lakhs}} = \frac{(X - 12 \text{ lakhs}) (1 - .5) - 0}{50 \text{ lakhs}}$$

$$\text{or } \frac{.5x}{150} = \frac{.5x - 6}{50}$$

$$\text{or } 25x = 75x - 900$$

$$\text{or } 50x = -900$$

$$\text{or } 50x = 900$$

$$\text{or } x = \frac{900}{50} = \text{Rs}18 \text{ lakhs}$$

Thus, EBIT at point of indifference is Rs. 18 lakhs. At this level of EBIT, the earnings per share (EPS) will be the same under both the plans.

**Illustration 6 :**

ABC Co. Ltd is considering three plans for which the key information is as below :

a) Total investment to be raised Rs. 4,00,000.

b) Plans of financing proportion :

Plans	Equity	Debt	Preference capital
A	100%	-	-
B	50%	50%	-
C	50%	-	50%

c) Cost of debt is 8% and rate of preference dividend is 8%.

d) Equity shares of Rs 10 each will be issued at a premium of Rs. 10 per share

e) The expected EBIT is Rs. 1,60,000 and the tax rate is 50%.

**Determine for each plan :**

i) Earnings per share (EPS)

ii) the EBIT range among the plans for point of indifference.

**Solution :**

i) computation of EPS for each plan

	Plan A (Rs.)	Plan B (Rs.)	Plan C (Rs.)
EBIT	1,60,000	1,60,000	1,60,000
Less : Interest@8%	-	16,000	-
EBT	1,60,000	1,44,000	1,60,000
Less Tax @ 50%	80,000	72,000	80,000
Earnings after tax	80,000	72,000	80,000
Less : Preference dividend 8%	-	-	16,000
Earnings available to equity shareholders	80,000	72,000	64,000
No. of equity shares	20,000	10,000	10,000
Earnings per share	Rs. 4.00	Rs. 7.20	Rs. 6.40

ii) Computation of EBIT range among the plans for point of indifference.

a) Point of indifference between plan A and B :

$$\frac{(X - I_1) (1 - T) - D_p}{N_1} = \frac{(X - I_2) (1 - T) - PD}{N_2}$$

Where,

X = EBIT at point of indifference

 $I_1$  = Interest under plan 1 $I_2$  = Interest under plan 2

T = Tax rate

 $D_p$  = Preference dividend $N_1$  = Number of equity shares under plan 1 $N_2$  = Number of equity shares under Plan 2

$$\frac{(X - 0) (1 - .5) - 0}{20,000} = \frac{(X - 16,000) (1 - .5) - 0}{10,000}$$

$$\text{or } \frac{.5x}{20,000} = \frac{.5x - 8000}{10,000}$$

$$\text{or } 10,000 (.5x) = 20,000 (.5x - 8000)$$

$$\text{or } .5x = 2 (.5x - 8000)$$

$$\text{or } .5x = x - 16,000$$

$$\text{or } .5x = 16,000$$

$$\therefore x = \frac{16,000}{.5} = \text{Rs. } 32,000$$

Thus, point of difference between plan A and Plan B is Rs. 32,000.

b) Between plan A and C

$$\frac{(X - 0) (1 - .5) - 0}{20,000} = \frac{(X - 0) (1 - .5) - 16,000}{10,000}$$

or

$$\frac{.5x}{20,000} = \frac{.5x - 16,000}{10,000}$$

or

$$.5x = 2 (.5x - 16,000)$$

or

$$.5x = x - 32,000$$

or

$$.5x = 32,000$$

$$\therefore x = \frac{32,000}{.5} = \text{Rs. } 64,000$$

c) Between plan B and C

$$\frac{(x - 16,000) (1 - .5) - 0}{10,000} = \frac{(x - 0) (1 - .5) - 16,000}{10,000}$$

$$.5x - 8,000 = .5x - 16,000$$

Thus, there is no point of indifference between plan B and C

### 7.5 Combined Leverage - Meaning and measurement

As discussed earlier, operating leverage measures the effect of a change in sales on EBIT. It explains the degree of operating risk. Financial leverage measures the effect of a change in operating EBIT or EPS. Thus, it explains the degree of financial risk. When these two leverages are combined it indicates the effect of change in sales on EPS. This combined leverage or composite leverage can be computed as follows :

Degree of Composite leverage = Operating Leverage x Financial Leverage

$$\text{Degree of Operating leverage} = \frac{\text{Sales} - \text{VC}}{\text{EBIT}} = \frac{\text{Contribution}}{\text{EBIT}}$$

$$\text{Degree of Financial leverage} = \frac{\text{EBIT}}{\text{EBT}} = \frac{\text{EBIT}}{\text{EBIT} - \text{Interest on debt}}$$

$$\text{Degree of Composite leverage} = \frac{\text{Contribution}}{\text{EBIT}} \times \frac{\text{EBIT}}{\text{EBT}}$$

$$= \frac{\text{Contributionsales} - \text{Variable operating Cost}}{\text{EBT}} = \frac{\text{EBIT} - \text{Interest an debt}}{\text{EBT}}$$

The degree of combined or composite leverage can also be calculated as follows :

$$\text{Degree of combined leverage} = \frac{\text{Percentage change in EPS}}{\text{Percentage change in sales}}$$



**Illustration 7**

ABC Ltd, has sales of Rs. 10,00,000; Variable cost of Rs. 4,00,000 and fixed costs of Rs. 2,00,000. It has a long term debt of Rs. 20,00,000 at 10% rate of interest. Calculate the operating, financial and combined leverages.

**Solution :**

Sales :	Rs. 10,00,000
Less Variable Cost :	Rs. <u>4,00,000</u>
Contribution :	6,00,000
Less : Fixed Cost	<u>2,00,000</u>
EBIT	4,00,000
Less Interest@10%	<u>2,00,000</u>
EBT	<u>2,00,000</u>

$$\text{i) Operating Leverage} = \frac{\text{Contribution}}{\text{EBIT}} = \frac{6,00,000}{4,00,000} = 1.5$$

$$\text{ii) Financial Leverage} = \frac{\text{EBIT}}{\text{EBT}} = \frac{4,00,000}{2,00,000} = 2$$

$$\text{iii) Composite Leverage} = \text{DOL} \times \text{DFL} = 1.5 \times 2 = 3$$

$$\text{or} \quad = \frac{\text{Contribution}}{\text{EBT}} = \frac{6,00,000}{2,00,000} = 3$$

**Illustration 8**

A firm has sales of Rs. 20,00,000; variable cost of Rs. 14,00,000 and fixed costs of Rs. 4,00,000 and debt of Rs. 10,00,000 at 10% rate of interest. What are operating, financial and composite leverages? If the firm wants to double its EBIT, how much of a percentage rise would be needed?

**Solution :**

	Rs.
Sales :	20,00,000
Less : Variable Cost :	<u>14,00,000</u>
Contribution :	6,00,000
Less : Fixed Cost :	<u>4,00,000</u>
EBIT	2,00,000
Less : Interest@10% on Rs. 10,00,000	<u>1,00,000</u>
EBT :	<u>1,00,000</u>

$$\text{a) Operating Leverage} = \frac{\text{Contribution}}{\text{EBIT}} = \frac{6,00,000}{2,00,000} = 3$$

$$\text{b) Financial Leverage} = \frac{\text{EBIT}}{\text{EBT}} = \frac{2,00,000}{1,00,000} = 2$$

c) Combined leverage = Operating leverage x Financial leverage =  $3 \times 2 = 6$

Percentage rise in sales needed to double the EBIT :

As the operating leverage is 3, if sales increase by 100% EBIT will increase by 300%. So, if sales increase by  $33 \frac{1}{3}\%$ , EBIT will increase by 100%, i.e. EBIT will double.

**Verification :**

Sales (after $33 \frac{1}{3}$ increase) (20,00,000+6,66,667)	26,66,667
Less : variable cost (at 70% of sales)	<u>18,66,667</u>
Contribution :	8,00,000
Less : Fixed Cost	4,00,000
EBIT	<u>4,00,000</u>

### 7.6 Importance of Financial and Operating Leverages

The two important quantitative tools used by the financial experts to measure the return to equity shareholders and the market price of equity shares are the operating and financial leverages. Of these two tools, the financial leverage is considered to be superior, because it focusses the attention on the earnings of the shareholders and the market price of the shares.

A firm resorts to financial leverage or trading on equity to magnify the earnings of equity shareholders. Financial leverage is significant in the following two ways :

**i) Planning of capital structure :** The capital structure is concerned with the debt - equity ratio. It helps in selecting the optimum capital structure which gives the highest EPS.

**ii) Profit planning :** The earnings per share is affected by the degree of financial leverage. In case the profitability of the firm is increasing, the fixed cost funds will help in increasing the availability of profits for equity shareholders. Thus, financial leverage is important for profit planning.

However, a firm cannot continue to increase debt capital to magnify shareholders' earnings because financial leverage has the risk of adversely affecting the earnings which is known as financial risk. If a firm employs more and more debt capital, it increases the financial risk. Moreover, a firm with widely fluctuating earnings cannot afford to employ more debt capital.

A company should try to have a balance of the two leverages because they got tremendous acceleration or deceleration effect on EBIT and EPS. A proper combination of both operating and financial leverages is of great advantage to the firm's growth, while an inappropriate combination may prove to be a curse as explained below :

i) A very high degree of operating as well as financial leverages will make the position of a firm very risky. When both the leverages are high, it implies that the firm has high fixed operating cost and fixed interest charges. As a result, the earnings of shareholders widely fluctuate.

ii) If a firm has a high operating leverage, it should not have a high financial leverage. It should have a low financial leverage.

iii) In the same way, firm with a low operating leverage will get the benefit by having a high financial leverage, provided it has enough profitable opportunities for the borrowed funds.

iv) If both the leverages are low, it means that the management of the firm is adopting a very cautious attitude. It results in losing a good no. of investment opportunities.

Of all the above cases, low operating leverage and high financial leverage is the ideal situation for making maximum profits with minimum of risk. So the management of the firm should properly combine both the leverages to get the maximum advantage.

### 7.7. Summary

The use of fixed income - bearing debt and preference shares along with equity, for the benefit of owners of the firm is called financial leverage or trading on equity. Financial leverage has both favourable and adverse effect on shareholders' earnings. The degree of financial leverage is computed with the following formulae :

$$\text{Financial leverage} = \frac{EBIT}{EBT}$$

$$\text{or DFL} = \frac{\text{Percentage change in EPS}}{\text{Percentage change in Sales}}$$

The EBIT - EPS analysis helps in identifying the most appropriate financial plan from among various alternative financial plans. It helps in designing proper capital structure for a firm. The point of indifference refers to that level of earnings before interest and tax (EBIT) at which EPS remains the same, irrespective of different alternatives of debt - equity mix. This point is also known as break -even level of EBIT for alternative financial plans.

A company should try to have a balance of both operating and financial leverages, because they got tremendous acceleration or deceleration effect on EBIT and EPS. A proper combination of these leverages is of great advantage to the firm's growth.

### 7.8 Key words

**Financial Leverage :** It refers to the employment of fixed - income bearing securities in capital structure.

**Trading on Equity :** Employment of debt capital for the benefit of equity shareholders.

**Indifference point :** It refers to that level of EBIT at which the EPS is the same for two Financial plans.

**Composite Leverage :** It is the combined effect of both financial and operating leverages.

**EBIT-EPS analysis :** It is an important tool which shows the effect of financial leverage on earnings per share.

### 7.9 Self - Assessment Questions

1. What is meant by financial leverage? Explain how it magnifies the revenue available to equity shareholders.
2. What is leverage? Distinguish between operating and financial leverages.
3. Explain the significance of operating and financial leverages.
4. Explain the following :
  - i) Financial leverage
  - ii) Trading on equity
  - iii) Composite leverage

### 7.10 Suggested Readings

1. James C. Van Horne : Financial Management
2. Khan and Jain : Financial Management
3. Pandey I.M. : Financial Management

## Lesson - 8

# CAPITAL STRUCTURE - DETERMINANTS AND THEORIES

### OBJECTIVES

After studying this lesson you will be able to learn :

- ★ the meaning of capital structure and optimum capital structure
- ★ the major determinants of capital structure of a firm
- ★ the various theories of capital structure

### STRUCTURE

- 8.1 Introduction
- 8.2 Features of an appropriate capital structure
- 8.3 Determinants of capital structure
- 8.4 Optimum capital structure - meaning
- 8.5 Theories of capital structure
  - Net Income approach
  - Net operating income approach
  - The Traditional View
  - Modigliani - Miller hypothesis without taxes
  - M-M Hypothesis with corporate taxes
- 8.6 Summary
- 8.7 Key Words
- 8.8 Self assessment questions
- 8.9 Further Readings

#### 8.1 Introduction

A firm needs funds for long - term requirements and working capital. These funds are raised through different sources both short - term and long - term. The long - term funds required by a firm are mobilised through owners' funds (equity share, preference shares and retained earnings) and long - term debt (debentures and bonds). A mix of various long - term sources of funds employed by a firm is called capital structure. In this lesson, we discuss the meaning of capital structure, determinants of capital structure and various theories that explain the relationship between capital structure and cost of capital and capital structure and value of the firm. Capital structure refers to the long - term sources of funds employed by firm, viz, equity shares, preference shares, reserves and debt capital.

According to Gerestenberg, "Capital structure of a company refers to the composition or make - up of its capitalisation and it includes all long - term capital resources, viz, loans, bonds, shares and reserves" Thus capital structure is made - up of debt and equity securities and refers to permanent financing of a firm !

### 8.1.1 Capital structure and Financial Structure

Some authors use capital structure and financial structure interchangeably. But, both are different concepts. Financial structure refers to the way in which the total assets of a firm are financed. In other words, financial structure refers to the entire liabilities side of the balance sheet. But, capital structure represents only long - term sources of funds and excludes all short - term debt and current liabilities. Thus, financial structure is a broader one and capital structure is only a part of it.

### 8.3 Features of an appropriate capital structure

It is the duty of the financial manager to develop an appropriate capital structure which is most advantageous to the company. The capital structure should be planned carefully keeping in view, the interests of the equity shareholders as they are the ultimate owners of the company.

The planning and designing of an appropriate capital structure is not an easy task. However, it must be seen while designing the capital structure, that a sound or appropriate capital structure should have the following features :

- i) **Profitability** : The capital structure of the company should be most advantageous. It should maximise the earnings per share while minimising cost of financing.
- ii) **Solvency** : Excessive use of debt threatens the solvency of the company. Therefore, the debt capital should be employed upto such a level that the financial risk is within manageable limits.
- iii) **Flexibility** : The capital structure should be flexible enough to meet the changing conditions. It must be possible for the company to provide funds whenever needed to finance any profitable activities.
- iv) **Conservatism** : The capital structure of the company should be conservative in the sense that the debt component of the firm should not exceed debt capacity of the firm. The debt capacity of the firm depends on its ability to generate enough future cashflows for meeting interest obligation and repayment of principal when it becomes due.
- v) **Control** : The capital structure should be designed in such a way that it involves a minimum loss of control of the company by the existing shareholders/directors.

The above mentioned are the general features of an appropriate capital structure. The relative importance of these features may differ from one company to another. For example, one company may give more importance to flexibility to conservatism, and another company may go for solvency rather than profitability. But it may be said that the company's capital structure should be easily adaptable.

### 8.3 Determinants of capital structure

The capital structure of a firm depends on a number of factors and these factors are of different importance. Moreover, the influence of individual factors of a firm changes over a period of time. Generally, the following factors should be considered while determining the capital structure of a company.

#### i) Trading on equity and EBIT - EPS analysis.

The use of long - term debt and preference share capital, which are fixed income - bearing securities, along with equity share capital is called financial leverage or trading on equity. The use of long - term debt capital increases the earnings per share (EPS) as long as the return on investment (ROI) is greater



than the cost of debt. Preference share capital will also result in increasing EPS. But the leverage effect is more pronounced in case of debt because of two reasons : i) cost of debt is usually lower than the cost of preference share capital, and ii) the interest paid on debt is tax deductible.

Because of its effects on the earnings per share, financial leverage is one of the important considerations in planning the capital structure of a company. The companies with high level of Earnings Before Interest and Taxes (EBIT) can make profitable use of the high degree of leverage to increase the return on the shareholders' equity. The EBIT - EPS analysis is one important tool in the hands of the financial manager to get an insight into the firm's capital structure planning. He can analyse the possible fluctuations in EBIT and their impact on EPS under different financing plans.

Under favourable conditions, financial leverage increases EPS, however it can also increase financial risk to shareholders. Therefore, the firm should employ debt to such an extent that financial risk does not spoil the leverage effect.

### **ii) Growth and stability of sales**

This is another important factor which influences the capital structure of a firm. Stability of sales ensures stable earnings, so that the firm will not face any difficulty in meeting its fixed commitments of interest payment and repayment of debt. So the firm can raise a higher level of debt. In the same way, the rate of growth in sales also affects the capital structure decision. Usually, greater the rate of growth of sales, greater can be the use of debt in the financing of a firm. On the other hand, the firm should be very careful in employing debt capital if its sales are highly fluctuating and declining.

### **iii) Cost of capital**

Cost of capital is another important factor that should be kept in mind while designing the capital structure of a firm. The capital structure should be designed in such a way that the firm's overall cost of capital is the minimum. Cost of capital is the minimum return expected by its suppliers. Of all the sources of capital, equity capital is the costliest as the equity shareholders bear the highest risk. On the other hand, debt capital is the cheapest source because the interest is paid on it by the firm whether it makes profits or not. Moreover, interest on debt capital is tax deductible, which makes it further cheaper. Preference share capital is also cheaper than equity capital as the dividends are paid at a fixed rate on preference shares. So, the overall cost of capital depends on the proportion in which the capital is mobilised from different sources of finance. Hence, capital structure should be designed carefully so that overall cost of capital is minimised.

### **iv) Cash flow ability**

A firm which has the ability of generating larger and stable cash inflows will be able to employ more debt capital. The firm has to meet fixed charges in the form of interest on debt capital, fixed preference dividend and the principal amount, when it becomes due. The firm can meet these fixed obligations only when it has adequate cash inflows. Whenever a firm wants to raise additional funds, it should estimate the future cash inflows to ensure the coverage of fixed charges. Fixed charges coverage ratio and interest coverage ratio are relevant for this purpose.

Here, one important point to be considered is that it is the cash flow ability of the firm and not the earning capacity alone (as indicated by EBIT) that should be taken into view while designing the capital structure. A firm may have adequate profits (EBIT) but it may not have adequate cash inflows to meet its fixed charges obligation. Some times, inadequacy of cash inflows may lead the firm to the point of insolvency, when it fails to meet its payment obligations in time. Therefore debt capacity of the firm is determined by its cash flow ability.



**v) Control**

Some times, the designing of capital structure of a firm is influenced by the desire of the existing management to retain the control over the firm. Whenever additional funds are required, the management of the firm wants to raise the funds without any loss of control over the firm. If equity shares are issued for raising funds, the control of the existing shareholders is diluted. Because of this, they may raise the funds by issuing fixed charge bearing debt and preference share capital, as preference shareholders and debtholders do not have any voting right. The Debt financing is advisable from the point of view of control. But overdependence on debt capital may result in heavy burden of interest and fixed charges and may lead to liquidation of the company.

**vi) Flexibility**

Flexibility means the firm's ability to adapt its capital structure to the needs of the changing conditions. Capital structure should be flexible enough to raise additional funds whenever required, without much delay and cost. The capital structure of the firm must be designed in such a way that it is possible to substitute one form of financing for another to economise the use of funds. Preference shares and debentures offer the highest flexibility in the capital structure, as they can be redeemed at the discretion of the firm.

**vii) Size of the firm**

The size of the firm influences the capital structure design of a firm. Small companies find it very difficult to mobilise long - term debt, as they have to face higher rate of interest and inconvenient terms. Hence, small firms make their capital structure very inflexible and depend on share capital and retained earnings for their long - term funds. Since their capital structure is small, small firms cannot go to the capital market frequently for the issue of equity shares, as it carries a greater danger of loss of control over the firm to others. Hence, the small firms sometimes limit the growth of their business and any additional fund requirements met through retained earnings only. However, a large firm has relative flexibility in capital structure designing. It has the facility of obtaining long - term debt at relatively lower rate of interest and convenient terms. Moreover, the large firms have relatively an easy access to the capital market.

**viii) Marketability and timing**

Capital market conditions may change from time to time. Sometimes there may be depression and at other times there may be boom condition in the market. The firm should decide whether to go for equity issue or debt capital by taking market sentiments into consideration. In the case of depressed conditions in the share market, the firm should not issue equity shares but go for debt capital. On the other hand, under boom conditions, it becomes easy for the firm to mobilise funds by issuing equity shares.

The internal conditions of a firm may also determine the marketability of securities. For example, a highly levered firm may find it difficult to raise additional debt. In the same way, a firm may find it very difficult to mobilise funds by issuing any kind of security in the market merely because of its small size.

**ix) Floatation costs**

Floatation costs are not a very significant factor in the determination of capital structure. These costs are incurred when the funds are raised externally. They include cost of the issue of prospectus, brokerage, commissions, etc. Generally, the cost of floatation for debt is less than for equity. So, there

may be a temptation for debt capital. There will be no floatation cost for retained earnings. As is said earlier, floatation costs are not a significant factor except for small companies.

Floatation costs can be an important consideration in deciding the size of the issue of securities, because these costs as a percentage of funds raised will decline with the size of the issue. Hence, greater the size of the issue, more will be the savings in terms of floatation costs. However, a large issue affects the firm's financial flexibility.

#### x) Purpose of financing

The purpose for which funds are raised should also be considered while determining the sources of capital structure. If funds are raised for productive purpose, debt capital is appropriate as the interest can be paid out of profits generated from the investment. But, if it is for unproductive purpose, equity should be preferred.

#### xi) Legal requirements

The various guidelines issued by the Government from time to time regarding the issue of shares and debentures should be kept in mind while determining the capital structure of a firm. These legal restrictions are very significant as they give a framework within which capital structure decisions should be made.

### 8.4 Optimum capital structure

The capital structure of a firm influences its cost of capital and the value of the firm. So, the financial manager of the firm should aim at achieving the optimum capital structure and then to maintain it. An optimum capital structure may be defined as that combination of debt and equity that maximise the total value of the firm or minimises the weighted average cost of capital. According to Ezra Solomon, the optimum capital structure refers to that degree of financial leverage at which the market value of the firm's securities will be higher or the cost of capital will be lower than at other degrees of leverage.

### 8.5 Theories of capital structure

But, the existence of an optimum capital structure is not accepted by all. There are two extreme views or schools of thought regarding the existence of an optimum capital structure. As per one view, capital structure influences the value of the firm and cost of capital and hence there exists an optimum capital structure. On the other hand, The other school of thought advocates that capital structure has no relevance and it does not influence the value of the firm and cost of capital. Reflecting these views, different theories of capital structure have been developed. The main contributors to the theories are David Durand, Ezra Solomon, Modigliani and Miller.

The important theories of capital structure are :

Net Income Approach

Net Operating Income Approach

The Traditional view

Modigliani and Miller hypothesis



### Assumptions Underlying the Theories :

In order to have a clear understanding of these theories and the relationship between capital structure and value of the firm or cost of capital, the following assumptions are made :

- i) Firms employ only debt and equity.
- ii) The total assets of the firm are given.
- iii) The firm's total financing remains constant. The degree of leverage can be changed by selling debt to repurchase shares or selling shares to retire debt.
- iv) The firm has 100% payout ratio, i.e., it pays 100% of its earnings as dividends.
- v) The operating earnings (EBIT) of the firm are not expected to grow.
- vi) The business risk is assumed to be constant and independent of capital structure and financial risk.
- vii) Investors have the same subjective probability distribution of expected future operating earnings for a given firm .
- viii) There are no corporate and personal taxes. This assumption is relaxed later.

In analysing the capital structure theories the following basic definitions are used :

$S$  = market value of common shares

$D$  = market value of debt

$V = S + D$  = market value of the firm

$NOI = \bar{X}$  = expected net operating income, i.e., Earnings before interest and taxes (EBIT)

$NI = NOI - \text{Interest} = \text{Net Income or shareholders earnings.}$

#### 8.5.1. Net Income Approach

This approach was identified by David Durand. According to this approach, capital structure has relevance, and a firm can increase the value of the firm and minimise the overall cost of capital by employing debt capital in its capital structure. According to this theory, greater the debt capital employed, lower shall be the overall cost of capital and more shall be the value of the firm.

This theory is subject to the following assumptions :

- i) The cost of debt is less than cost of equity.
- ii) The risk perception of investors is not affected by the use of debt. As a result, the equity capitalisation rate ( $k_e$ ) and the debt - capitalisation rate ( $k_d$ ) don't change with leverage.
- iii) There are no corporate taxes.

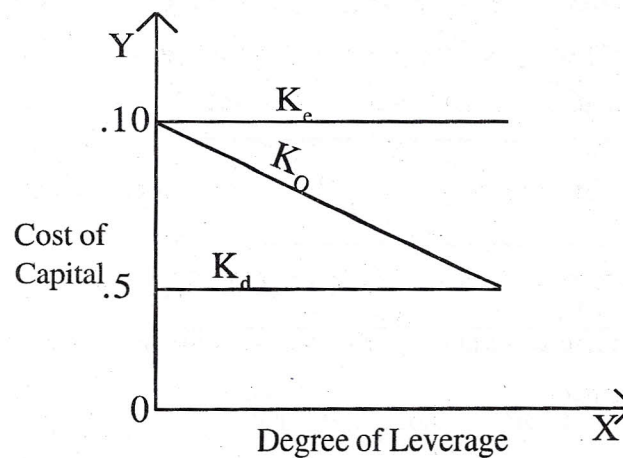
According to the above assumptions, cost of debt is cheaper than cost of equity and they remain constant irrespective of the degree of leverage. If more debt capital is used because of its relative cheapness, the overall cost of capital declines and the value of the firm increases.

According to this approach :

$$V = S + D$$

$$S = \text{market value of equity} = \frac{NI}{K_e}$$

$$K_0 = \text{overall cost of capital} = \frac{EBIT}{V}$$



NI Approach : Figure 8 : 1

It is evident from the above diagram that when degree of leverage is zero (i.e. no debt capital employed), overall cost of capital is equal to cost of equity ( $k_0 = k_e$ ). If debt capital is employed further and further which is relatively cheap when compared to cost of equity, the overall cost of capital declines, and it becomes equal to cost of debt ( $k_d$ ) when leverage is one (i.e. the firm is fully debt financed). Thus, according to this theory, the firm's capital structure will be optimum, when degree of leverage is one.

### 8.5.2. Net operating Income Approach

This net operating income (NOI) approach is also suggested by David Durand. This represents another extreme view that capital structure and value of the firm are irrelevant. The capital structure of the firm does not influence cost of capital and value of the firm. The value of the firm ( $V$ ) is determined as follows :

$$V = S + D = \frac{NOI}{K_0}$$

$K_0$  is the overall cost of capital and depends on the business risk of the firm. It is not affected by financing mix.

The critical assumptions of this theory are :

1. The market capitalises the value of the firm as a whole. Thus, the split between debt and equity is not important.
2. The business risk remains constant at every level of debt - equity mix.

3. There are no corporate taxes.
4. The debt capitalisation rate ( $K_d$ ) is constant.

According to this theory, the use of less costly debt increases the risk to equity shareholders. This causes the equity capitalisation rate ( $K_e$ ) to increase. As a result, the low cost advantage of debt is exactly offset by the increase in the equity capitalisation rate. Thus, the overall capitalisation rate ( $K_o$ ) remains constant and consequently the value of the firm does not change.

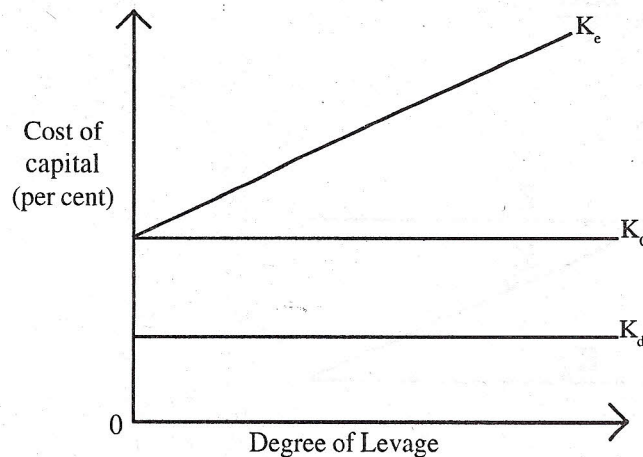


Chart 8.2 NoI Approach :

The above diagram shows that  $K_o$  and  $K_d$  are constant and  $K_e$  increases with leverage continuously. The increase in cost of equity ( $K_e$ ) exactly offsets the advantage of low cost debt, so that overall cost of capital ( $K_o$ ) remains constant, at every degree of leverage. It implies that every capital structure is optimum and there is no unique optimum capital structure.

### 8.5.3. The traditional view

This approach, which is also known as intermediate approach, has been popularised by Ezra Solomon. It is a compromise between the two extremes of net income approach and net operating income approach. According to this approach, cost of capital can be reduced or the value of the firm can be increased with a judicious mix of debt and equity. This theory says that cost of capital declines with increase in debt capital upto a reasonable level, and later it increases with a further rise in debt capital.

The way in which the overall cost of capital reacts to changes in capital structure can be divided into three stages under traditional position.

#### Stage I :

In this stage, the cost of equity ( $K_e$ ) and the cost of debt ( $K_d$ ) are constant and cost of debt is less than cost of equity. The employment of debt capital upto a reasonable level will cause the overall cost of capital to decline due to the low cost advantage of debt.

#### Stage II :

Once the firm has reached a reasonable level of leverage, a further increase in debt will have no effect on the value of the firm and the cost of capital. This is because of the fact that a further rise in debt



capital increases the risk to equity shareholders which leads to a rise in equity capitalisation rate ( $K_e$ ). This rise in cost of equity exactly offsets the low - cost advantage of debt capital so that the overall cost of capital remains constant.

### Stage III

If the firm increases debt capital further and further beyond reasonable level, it will cause an increase in risk to both equity shareholders and debt - holders, because of which both cost of equity and cost of debt start rising in this stage. This will in turn will cause an increase in overall cost of capital.

If the overall effect of all the three stages is taken, it is evident that cost of capital declines and the value of the firm increases with a rise in debt capital upto a certain reasonable level. If debt capital is further increased beyond this level, the overall cost of capital ( $K_0$ ) tends to rise and as a result the value of the firm will decline.

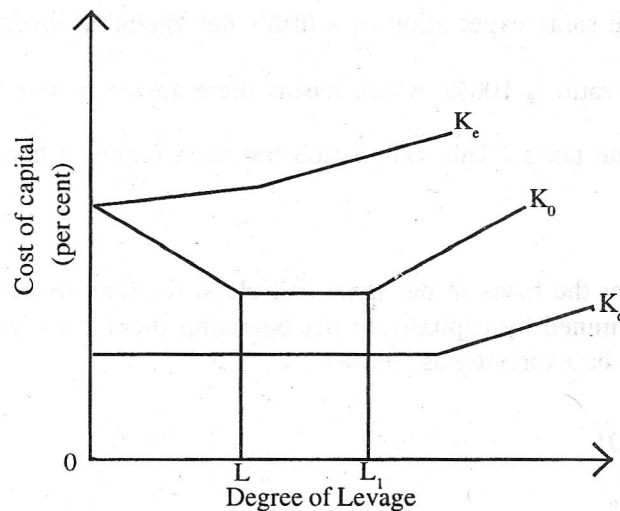


Figure 8.2 Traditional view:

It is evident from Figure 8.2 that the overall cost of capital declines with an increase in leverage upto point  $L$  and it increases with rise in the leverage after point  $L_1$ . Hence, the optimum capital structure lies in between  $L$  and  $L_1$ .

### 8.5.4. Modigliani - Miller (MM) Hypothesis - Without Taxes

The Modigliani - Miller hypothesis is identical with the net operating Income approach. Modigliani and Miller argued that, in the absence of taxes the cost of capital and the value of the firm are not affected by the changes in capital structure. In other words, capital structure decisions are irrelevant and value of the firm is independent of debt - equity mix.

#### Basic Propositions :

M - M Hypothesis can be explained in terms of two propositions of Modigliani and Miller. They are:

(i) The overall cost of capital ( $K_0$ ) and the value of the firm are independent of the capital structure. The total market value of the firm is given by capitalising the expected net operating income by the rate appropriate for that risk class.



(ii) The financial risk increases with more debt content in the capital structure. As a result cost of equity ( $K_e$ ) increases in a manner to offset exactly the low - cost advantage of debt. Hence, overall cost of capital remains the same.

#### Assumptions of the MM Approach :

1. There is a perfect capital market. Capital markets are perfect when i) investors are free to buy and sell securities, ii) they can borrow funds without restriction at the same terms as the firms do, iii) they behave rationally, iv) they are well informed, and v) there are no transaction costs
2. Firms can be classified into homogeneous risk classes. All the firms in the same risk class will have the same degree of financial risk.
3. All investors have the same expectation of a firm's net operating income (EBIT).
4. The dividend payout ratio is 100%, which means there are no retained earnings.
5. There are no corporate taxes. This assumption has been removed later.

#### Proposition I

According to M - M, for the firms in the same risk class, the total market value is independent of capital structure and is determined by capitalising net operating income by the rate appropriate to that risk class. Proposition I can be expressed as follows :

$$V = S + D = \frac{\bar{x}}{K_0} = \frac{NOI}{K_0}$$

Where,  $V =$  the market value of the firm

$S =$  the market value of equity

$D =$  the market value of debt

$\bar{x} =$  the expected net operating income (EBIT)

$K_0 =$  the capitalisation rate appropriate to the risk class of the firm.

According to proposition I the average cost of capital is not affected by degree of leverage and is determined as follows :

$$K_0 = \frac{\bar{x}}{V}$$

According to M-M, the average cost of capital is constant as shown in the following Figure 8.3 :

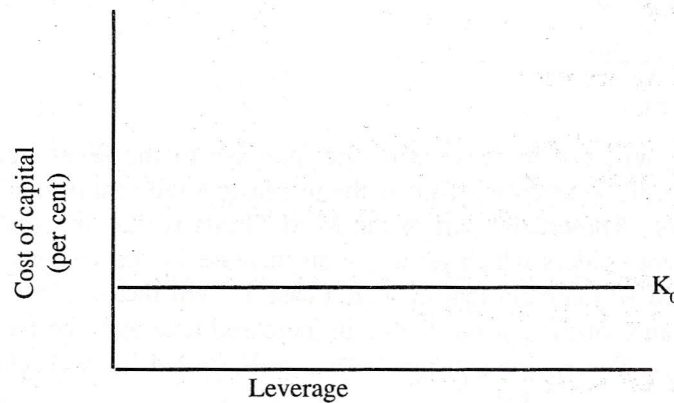


Figure 8.3 Average cost of capital

**Arbitrage process :**

According to M-M, two firms identical in all respects except their capital structure, cannot have different market values or different cost of capital. In case, these firms have different market values, the arbitrage will take place and equilibrium in market values is restored in no time. Arbitrage process refers to switching of investment from one firm to another. When market values are different, the investors will try to take advantage of it by selling their securities with high market price and buying the securities with low market price. The use of debt by the investors is known as personal leverage or home made leverage.

Because of this arbitrage process, the market price of securities in higher valued market will come down and the market price of securities in the lower valued market will go up, and this switching process is continued until the equilibrium is established in the market values. So, M M argue that there is no possibility of different market values for identical firms.

**Reverse working of Arbitrage process :**

Arbitrage process also works in the reverse direction. Leverage has neither advantage nor disadvantage. If an unlevered firm (with no debt capital) has higher market value than a levered firm (with debt capital) arbitrage process works in reverse direction. Investors will try to switch their investments from unlevered firm to levered firm so that equilibrium is established in no time.

Thus, M-M proved in terms of their proposition I that the value of the firm is not affected by debt - equity mix.

**Proposition II**

M-M's proposition II defines cost of equity. According to them, for any firm in a given risk class, the cost of equity is equal to the constant average cost of capital ( $K_0$ ) plus a premium for the financial risk, which is equal to debt - equity ratio times the spread between average cost and cost of debt. Thus, cost of equity is :

$$K_e = K_0 + (K_0 - K_d) \frac{D}{S}$$

where,  $K_e$  = cost of equity

$D/S$  = debt - equity ratio

M-M argue that  $K_0$  will not increase with the increase in the leverage, because the low - cost advantage of debt capital will be exactly offset by the increase in the cost of equity as caused by increased risk to equity shareholders. The crucial part of the M-M Thesis is that an excessive use of leverage will increase the risk to the debt holders which results in an increase in cost of debt ( $K_d$ ). However, this will not lead to a rise in  $K_0$ . M M maintain that in such a case  $K_e$  will increase at a decreasing rate or even it may decline. This is because of the reason that at an increased leverage, the increased risk will be shared by the debtholders. Hence  $K_0$  remains constant. This is illustrated in the Figure 8.9 given below :

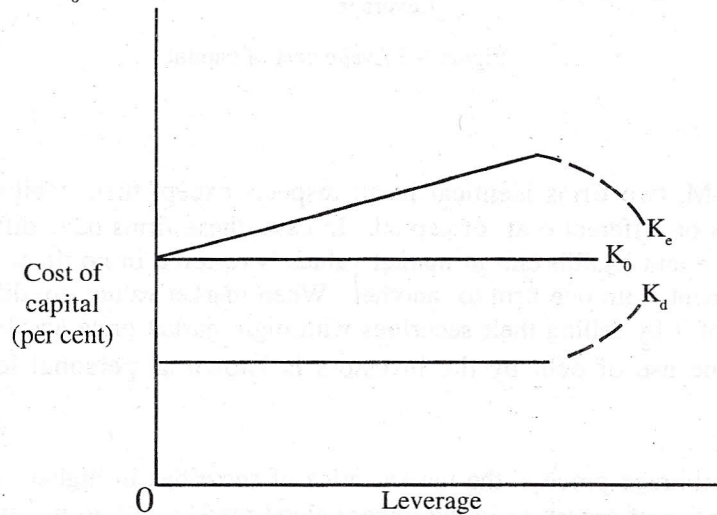


Figure 8.3 M M Hypothesis and cost of capital

### Criticism of M M Hypothesis

The arbitrage process is the behavioural and operational foundation for M M Hypothesis. But this process fails to bring the desired equilibrium because of the following limitations.

1. Rates of interest are not the same for the individuals and firms. The firms generally have a higher credit standing because of which they can borrow funds at a lower rate of interest as compared to individuals.
2. Home - Made leverage is not a perfect substitute for corporate leverage. If the firm borrows, the risk to the shareholder is limited to his shareholding in that company. But if he borrows personally, the liability will be extended to his personal property also. Hence, the assumption that personal or home - made leverage is a perfect substitute for corporate leverage is not valid.
3. The assumption that transaction costs do not exist is not valid because these costs are necessarily involved in buying and selling securities.
4. The working of arbitrage is affected by institutional restrictions, because the institutional investors are not allowed to practise home - made leverage.



5. The major limitation of M-M hypothesis is the existence of corporate taxes. Since the interest charges are tax deductible, a levered firm will have a lower cost of debt due to tax advantage when taxes exist.

#### 8.5.4. M-M Hypothesis Corporate Taxes

Modigliani and Miller later recognised the importance of the existence of corporate taxes. Accordingly, they agreed that the value of the firm will increase or the cost of capital will decrease with the use of debt due to tax deductibility of interest charges. Thus, the optimum capital structure can be achieved by maximising debt component in the capital structure.

According to this approach, value of a firm can be calculated as follows :

$$\text{Value of Unlevered firm } (V_U) = \frac{EBIT}{K_o} (1 - t)$$

$$\text{Value of Levered firm } (V_L) = V_U + Dt$$

Where, EBIT = Earnings before interest and taxes

$K_o$  = Overall cost of capital

D = Value of debt capital

t = Tax rate.

#### 8.6 Summary

Capital structure refers to the long - term sources of funds employed by a firm. The planning and designing of an appropriate capital structure is not an easy task. It depends upon a number of factors such as EBIT - EPS analysis, growth and stability of sales, cost of capital, cash flow ability of the firm, flexibility, etc.

An optimum capital structure is that combination of debt and equity which maximises the value of the firm or minimises the cost of capital. But, the existence of an optimum capital structure is not accepted by all. Hence, several theories of capital structure have been developed. As per the Net Income approach and the traditional view, capital structure influences the value of the firm and the cost of capital and hence there is an optimum capital structure. On the other hand, according to the Net operating Income approach and M M Hypothesis, capital structure has no relevance, and it does not influence the value of the firm and the cost of capital.

Modigliani and Miller supported their conclusions with the help of arbitrage process. However, they later realised the importance of the existence of corporate taxes and accepted that capital structure influences the value of the firm and cost of capital.

### 8.7 Key words

**Capital Structure :** Capital structure refers to the long - term sources of finance of a firm.

**Financial Leverage :** Employment of debt capital in the capital structure of a firm for the benefit of equity shareholders. Also known as trading on equity.

**Financial Risk :** The uncertainty about the future earnings of equity shareholders due to the use of debt capital by a firm.

**Arbitrage :** The process of switching of investment from higher - valued firm to lower - valued firm that results in equilibrium of the value of the two firms.

**Personal or Home - Made Leverage :** The use of debt by investors for arbitrage.

### 8.8 Self assessment Questions

1. What is meant by capital structure ? Explain the features of an appropriate capital structure.
2. What do you understand by capital structure ? Explain the major determinants of capital structure.
3. Explain Net Income (NI) and Net Operating Income (NO I) approaches.
4. What is the Traditional View on capital structure ?
5. Critically examine the Modigliani Miller Hypothesis of capital structure.
6. What is M M hypothesis of capital structure ? Does it make any difference if corporate taxes exist?
7. What is arbitrage ? How does it work ?

### 8.9 Further Readings

Van Horne, James C	:	Financial Management
Pandey I. M.	:	Financial Management
Prasanna Chandra	:	Financial Management



## LESSON - 9

**COST OF CAPITAL****Objectives**

The objectives of this lesson are to explain :

- \* the concept of cost of capital
- \* the significance of cost of capital
- \* the computation of specific cost of capitals
- \* the computation of weighted average cost of capital

**STRUCTURE :**

- 9.1 Introduction**
- 9.2 Cost of capital**
- 9.3 Importance of cost of capital**
- 9.4 Classification of cost of capital**
- 9.5 Determination of cost of capital**
- 9.6 Computation of cost of debt**
- 9.7 Cost of preference capital**
- 9.8. Cost of equity capital**
- 9.9 Cost of retained earnings**
- 9.10 Cost of Rights Issue**
- 9.11 Cost of convertible securities**
- 9.12 Computation of weighted Average Cost of capital**
- 9.13 Summary**
- 9.14 Key words**
- 9.15 Self Assessment Questions / Exercises**
- 9.16 Further Readings**

**9.1 Introduction**

It has been discussed in lesson - 4 that for evaluating capital investment proposals according to the sophisticated techniques like Net Present Value and Internal Rate of Return, the criterion used to accept or reject a proposal is the cost of capital. The cost of capital plays a significant role in capital budgeting decisions. In the present lesson the concept of cost of capital and the methods for its computation are explained.

**9.2 Cost of Capital**

The term cost of capital refers to the minimum rate of return a firm must earn on its investments. This is in consonance with the firm's overall objective of wealth maximisation. Cost of capital is a complex, controversial but significant concept in financial management.

The following definitions give clarity about the cost of capital.

Hampton J. : The cost of capital may be defined as " the rate of return the firm requires from investment in order to increase the value of the firm in the market place."

**James C. Van Horne** : The cost of capital is “a cut-off rate for the allocation of capital to investments of projects. It is the rate of return on a project that will leave unchanged the market price of the stock.”

**Solomon Ezra** : “Cost of Capital is the minimum required rate of earnings or the cut-off rate of capital expenditure.”

It is clear from the above definitions that the cost of capital is that minimum rate of return which a firm is expected to earn on its investments so that the market value of its shares is maintained. We can also conclude from the above definitions that there are three basic aspects of the concept of cost of capital :

- i) **Not a cost as such** : In fact the cost of capital is not a cost as such, it is the rate of return that a firm requires to earn from its projects.
- ii) **It is the minimum rate of return** : A firm’s cost of capital is that minimum rate of return which will at least maintain the market value of the shares.
- iii) It comprises three components :

$$k = r_o + b + f$$

where, k = cost of capital;

$r_o$  = return at zero risk level;

b = premium for business risk, which refers to the variability in operating profit (EBIT) due to change in sales.

f = premium for financial risk which is related to the pattern of capital structure.

### 9.3 Importance of cost of capital

The cost of capital is very important in financial management and plays a crucial role in the following areas :

**i) Capital budgeting decisions** : The cost of capital is used for discounting cash flows under Net Present Value method for evaluating investment proposals. So, it is very useful in capital budgeting decisions.

**ii) Capital structure decisions** : An optimal capital structure is that structure at which the value of the firm is maximum and cost of capital is the lowest. So, cost of capital is crucial in designing optimal capital structure.

**iii) Evaluation of Financial Performance** : Cost of capital is used to evaluate the financial performance of top management. The actual profitability is compared to the expected and actual cost of capital of funds and if profit is greater than the cost of capital the performance may be said to be satisfactory.

**iv) Other financial decisions** : Cost of capital is also useful in making such other financial decisions as dividend policy, capitalisation of profits, making the rights issue, etc.

### 9.4 Classification of cost of capital

Cost of capital can be classified as follows :

**i) Historical Cost and Future Cost** : Historical costs are book costs relating to the past, while future costs are estimated costs. Future costs are more relevant than historical costs in financial decision-making, whereas historical costs act as guide for estimation of future costs.

**ii) Specific Costs and Composite Cost** : Specific cost is the cost of a specific source of capital, while composite cost is combined cost of various sources of capital. Composite cost, also known as the weighted average cost of capital, should be considered in capital structure and capital budgeting decisions.

**iii) Explicit and Implicit Cost :** Explicit cost of any source of finance is the discount rate which equates the present value of cash inflows with the present value of cash outflows. It is the internal rate of return and is calculated with the following formula :

$$I_0 = \frac{C_1}{(I+K)^1} + \frac{C_2}{(I+K)^2} + \dots + \frac{C_n}{(I+K)^n}$$

$I_0$  = Net cash inflow received at zero point of time

$C$  = Cash outflow in the period concerned

$K$  = Explicit cost of capital

$n$  = Duration of time period

Implicit cost also known as the opportunity cost is the cost of the opportunity foregone in order to take up a particular project. For example, the implicit cost of retained earnings is the rate of return available to shareholders by investing the funds elsewhere.

**iv) Average Cost and Marginal Cost :** An average cost is the combined cost or weighted average cost of various sources of capital. Marginal cost of capital refers to the average cost of capital of new or additional funds required by a firm. It is the marginal cost which should be taken into consideration in investment decisions.

## 9.5 Determination of cost of capital

As stated already, cost of capital plays a very important role in making decisions relating to financial management. However, its determination is not an easy task. It involves the following problems.

### 9.5.1 Problems in determination of cost of capital :

- i) Conceptual controversy regarding the relationship between cost of capital and capital structure is a big problem.
- ii) Controversy regarding the relevance or otherwise of historic costs or future costs in decision making process.
- iii) Computation of cost of equity capital depends upon the expected rate of return by its investors. But the quantification of expectations of equity shareholders is a very difficult task.
- iv) Retained earnings has the opportunity cost of dividends foregone by the shareholders. Since different shareholders may have different opportunities for reinvesting dividends, it is very difficult to compute cost of retained earnings.
- v) Whether to use book value or market value weights in determining weighted average cost of capital poses another problem.

### 9.5.2 Computation of cost of capital :

Computation of cost of capital of a firm involves the following steps :

- i) Computation of cost of specific source of capital, viz., debt, preference capital, equity and retained earnings, and
- ii) Computation of weighted average cost of capital.

## 9.6 Cost of Debt ( $k_d$ )

Debt may be perpetual or redeemable debt. Moreover, it may be issued at par, at premium or at discount. The computation of cost of debt in each case is explained below.

### 9.6.1 Perpetual / irredeemable debt :

i) At par :

$$k_d = \text{Cost of debt before tax} = \frac{I}{P_o}$$

$k_d$  = Cost of debt; I = interest;  $P_o$  = net proceeds

$$k_d (\text{after-tax}) = \frac{I}{P} (1-t)$$

Where T = tax rate

#### Example : 1

i) A Ltd., issues Rs. 50,000 debentures of 8% at par. The tax rate is 50%. Determine the after tax cost of debt.

$$k_d (\text{before tax}) = \frac{\text{Rs. } 4000}{\text{Rs. } 50,000} \times 100 = 8\%$$

$$k_d (\text{after tax}) = k_d (\text{before tax}) \times (1 - T) = 8\% (1 - .5) = 4\%$$

ii) At premium or discount :

$$k_d (\text{before tax}) = \frac{I}{NP} \quad \text{where I = Interest}$$

NP = net proceeds.

$$k_d (\text{after tax}) = \frac{I}{NP} (1-t)$$

#### Example : 2

i) B Ltd has Rs. 50,000, 8% debentures at a premium of 10%. The tax rate applicable to the company is 40%. Compute the after tax cost of debt.

$$\text{Answer : } k_d (\text{before - tax}) = \frac{I}{NP} = \frac{\text{Rs. } 4,000}{55,000} \times 100 = 7.27\%$$

$$k_d (\text{after-tax}) = \frac{I}{NP} (1-t) = \frac{\text{Rs. } 4,000}{55,000} \times (1-.4) = 4.36\%$$

#### Example : 3

i) X Ltd has Rs. 1,00,000, 10% debentures issued at 5% discount. The tax rate is 40%. Compute the after tax cost of debt.

$$\text{Answer : } k_d (\text{before - tax}) = \frac{I}{NP} = \frac{\text{Rs. } 10,000}{\text{Rs. } 95,000} = 0.1053 \text{ or } 10.53\%$$

$$k_d (\text{after - tax}) = k_d (\text{before tax}) \times (1 - t) = 10.53 \times (1 - .4) = 10.53 \times .6 = 6.32\%$$

**Example :4**

Y Ltd issues Rs. 2,00,000, 9% debentures at a premium of 10%. The costs of floatation are 2%. The tax rate is 50%. Compute the after tax cost of debt.

$$\text{Answer : } k_d (\text{after - tax}) = \frac{I}{NP} (1-t) = \frac{Rs.18,000}{Rs.2,15,600} (1-.5) = 4.17\%$$

$$[\text{net proceeds} = Rs. 2,00,000 + 20,000 - (\frac{2}{100} \times 2,20,000)]$$

**9.6.2 Redeemable debt :**

The debt repayable after a certain period is known as redeemable debt. Its cost is computed by using the following formula :

$$\text{i) Before - tax cost of debt} = \frac{I + \frac{1}{n}(P - NP)}{\frac{1}{2}(P + NP)}$$

I = interest; P = proceeds at par;

NP = net proceeds; n = No. of years in which debt is to be redeemed

$$\text{ii) After tax cost of debt} = \text{Before - tax cost of debt} \times (1 - t)$$

**Example :5**

A company issues Rs. 1,00,000 10% redeemable debentures at a discount of 5%. The costs of floatation amount to Rs. 3,000. The debentures are redeemable after 5 years. Compute before - tax and after - tax Cost of debt. The tax rate is 50%.

**Solution :**

$$\begin{aligned} \text{Before tax cost of debt} &= \frac{I + \frac{1}{n}(P - NP)}{\frac{1}{2}(P + NP)} \\ &= \frac{10,000 + \frac{1}{5}(1,00,000 - 92,000)}{\frac{1}{2}(1,00,000 + 92,000)} = \frac{10,000 + 1600}{96,000} = \frac{11,600}{96,000} = 12.08\% \end{aligned}$$

$$[NP = 1,00,000 - 5,000 - 3,000 = 92,000]$$

$$\text{After tax cost of debt} = \text{Before - tax cost} \times (1-t) = 12.08 \times (1-.5) = 6.04\%$$

**9.7 Cost of Preference Capital ( $k_p$ )**

In case of preference shares dividends are payable at a fixed rate. However, the dividends are not allowed to be deducted for computation of tax. So, no adjustment for tax is required just like debentures, preference shares may be perpetual or redeemable. Further, they may be issued at par, premium or discount.



**9.7.1 Perpetual preference Capital :**

i) If issued at par :  $K_p = \frac{D}{P}$

$K_p$  = Cost of preference capital

$D$  = Annual preference dividend

$P$  = Proceeds at par value

ii) If issued at premium or discount :

$$K_p = \frac{D}{NP} \quad \text{Where NP = net proceeds.}$$

**Example : 6**

A company issues 10,000 10% preference shares of Rs. 10 each. Cost of issue is Rs. 2 per share. Calculate cost of preference capital, if these shares are issued (a) at par, (b) at 10% premium, and (c) at 5% discount.

**Solution :** Cost of preference capital,  $(K_p) = \frac{D}{NP}$

a) When issued at par :

$$K_p = \frac{Rs.10,000}{1,00,000 - 20,000} \times 100 = \frac{10,000}{80,000} \times 100 = 12.5\%$$

[Cost of issue = 10,000 x Rs. 2 = Rs. 20,000]

b) When issued at 10% premium :

$$K_p = \frac{Rs.10,000}{1,00,000 + 10,000 - 20,000} \times 100 = \frac{10,000}{90,000} \times 100 = 11.11\%$$

c) When issued at 5% discount :

$$K_p = \frac{Rs.10,000}{1,00,000 - 5,000 - 20,000} \times 100 = \frac{10,000}{75,000} \times 100 = 13.33\%$$

**9.7.2 Redeemable preference shares :** It is calculated with the following formula :

$$K_p = \frac{D + \frac{MV - NP}{n}}{\frac{1}{2}(MV + NP)}$$

Where,  $K_p$  = Cost of preference capital

$D$  = Annual preference dividend

$MV$  = Maturity value of preference shares

$NP$  = Net proceeds of preference shares

**Example : 7**

A company issues 1,00,000 10% preference shares of Rs. 10 each. Calculate the cost of preference capital if it is redeemable after 10 years.

- a) at par                      b) at 5% premium

**Solution :**

$$K_p = \frac{D + \frac{I}{n}(MV - NP)}{\frac{1}{2}(MV + NP)} \times 100$$

- a) Cost of preference capital, if redeemable at par :

$$K_p = \frac{Rs.1,00,000 + \frac{1}{10}(10,00,000 - 10,00,000)}{\frac{1}{2}(10,00,000 + 10,00,000)} \times 100 = \frac{Rs.1,00,000}{Rs.10,00,000} \times 100 = 10\%$$

- b) If redeemable at a premium of 5%  $K_p = \frac{Rs.1,00,000 + \frac{1}{10}(10,50,000 - 10,00,000)}{\frac{1}{2}(10,50,000 + 10,00,000)} \times 100$

$$= \frac{Rs.1,00,000 + 5,000}{Rs.10,25,000} \times 100 = \frac{Rs.1,05,000}{Rs.10,25,000} \times 100 = 10.24\%$$

**9.8 Cost of Equity capital ( $K_e$ ) :**

Cost of equity is the expected rate of return by the equity shareholders. Some argue that, as there is no legal binding for payment, equity capital doesnot involve any cost. But it is not correct. Equity shareholders normally expect some dividend from the company while making investment in shares. Thus, the rate of return expected by them becomes the cost of equity. Conceptually, cost of equity share capital may be defined as the minimum rate of return that a firm must earn on the equity part of total investment in a project in order to leave unchanged the market price of such shares. For the determination of cost of equity capital it may be divided into two categories :

- i) external equity or new issue of equity shares.
- ii) retained earnings.

The cost of external equity can be computed as per the following approaches :

**9.8.1. Dividend Yield / Dividend Price Approach :** According to this approach, the cost of equity will be that rate of expected dividends which will maintain the present market price of equity shares. It is calculated with the following formula :

$$K_e = \frac{D}{NP} \quad (\text{For new equity shares})$$

$$\text{or } K_e = \frac{D}{MP} \quad (\text{For existing shares})$$

Where,  $K_e$  = Cost of equity

$D$  = Expected dividend per share

$NP$  = Net proceeds per share

$MP$  = Market price per share

This approach rightly recognises the importance of dividends. However, it ignores the impact of retained earnings on the market price of equity shares. This method is suitable only when the company has stable earnings and stable dividend policy over a period of time.

### Example : 8

A company issues 10,000 equity shares of Rs. 100 each at a premium of 10%. The company has been paying 20% dividend to equity shareholders for the past five years and expects to maintain the same in the future also. Compute cost of equity capital. Will it make any difference if the market price of equity share is Rs. 150?

### Solution :

$$K_e = \frac{D}{NP} = \frac{Rs.20}{Rs.110} \times 100 = 18.18\%$$

If the market price per share = Rs. 150.

$$K_e = \frac{D}{MP} = \frac{Rs.20}{Rs.150} \times 100 = 13.33\%$$

**9.8.2. Dividend Yield plus Growth in Dividend Method :** According to this method, the cost of equity is determined on the basis of the expected dividend rate plus the rate of growth in dividend. This method is used when dividends are expected to grow at a constant rate.

Cost of equity is calculated as :

$$K_e = \frac{D_1}{NP} + g \quad (\text{for new equity issue})$$

Where,

$D_1$  = expected dividend per share at the end of the year. [ $D_1 = D_0 (1+g)$ ]

$NP$  = net proceeds per share

$g$  = growth in dividends

Cost of equity for existing shares is calculated as :

$$\frac{D_1}{MP} + g$$

Where,

$MP$  = market price per share.

**Example : 9**

ABC Ltd plans to issue 1,00,000 new equity shares of Rs. 10 each at par. The floatation costs are expected to be 5% of the share price. The company pays a dividend of Rs 1. per share and the growth rate in dividends is expected to be 5%. Compute the cost of new issue of shares.

If the current market price of the share is Rs. 15, calculate the cost of existing equity share capital.

**Solution :**

$$\text{Cost of new equity shares} = (K_e) = \frac{D}{NP} + g$$

$$K_e = \frac{1}{(10 - .50)} + 0.05 = \frac{1}{9.5} + 0.05$$

$$= 0.1053 + 0.05$$

$$= 0.1553 \text{ or } 15.53\%$$

$$\text{Cost of existing equity shares : } k_e = \frac{D}{MP} + g$$

$$K_e = \frac{1}{Rs.15} + 0.05 = 0.0667 + 0.05 = 0.1167 \text{ or } 11.67\%.$$

**9.8.3. Earnings Yield Method :** According to this approach, the cost of equity is the discount rate that capitalises a stream of future earnings to evaluate the shareholdings. It is calculated by taking earnings per share (EPS) into consideration. It is calculated as :

$$i) \quad K_e = \frac{\text{Earnings per share}}{\text{Net proceeds}} = \frac{EPS}{NP} \quad [\text{For new shares}]$$

$$ii) \quad K_e = \frac{EPS}{MP} \quad [\text{for existing equity}]$$

**Example : 10**

XYZ Ltd is planning for an expenditure of Rs. 120 lakhs for its expansion programme. No. of existing equity shares are 20 lakhs and the market value of equity share is Rs. 60. It has net earnings of Rs. 180 lakhs.

Compute the cost of existing equity share capital and the cost of new equity capital assuming that new shares will be issued at a price of Rs. 52 per share and the costs of new issue will be Rs. 2 per share.

**Solution :**

$$a) \quad \text{Cost of existing equity} = (K_e) = \frac{EPS}{MP}$$

$$\text{Earnings per share (EPS)} = \frac{1,80,00,000}{20,00,000} = Rs. 9$$

$$\therefore K_e = \frac{9}{60} = 0.15 \text{ or } 15\%$$

$$b) \quad \text{Cost of new equity capital : } (K_e) = \frac{EPS}{NP} = \frac{9}{52-2} = \frac{9}{50} = 0.18 \text{ or } 18\%$$

**9.8.4. Realised Yield Method :** One of the major limitations of using dividend yield or earnings yield methods is that it is not possible to estimate future dividends and earnings correctly. To remove this drawback, realised yield method may be used. This method takes into account the actual rate of return realised in the past. The dividend received in the past and the gain realised at the time of sale of shares should be considered for the calculation of the average rate of return. This approach gives fairly good results in case of companies with stable dividends and growth record.

### 9.9 Cost of Retained Earnings ( $K_r$ ) :

Retained earnings refer to undistributed profits of a firm. Out of the total earnings, firms generally distribute only a part of them in the form of dividends and the rest will be retained within the firms. Since no dividend is required to be paid on retained earnings, some people feel that 'retained earnings carry no cost'. But this approach is not appropriate. Retained earnings has the opportunity cost of dividends foregone by the investors. The rate of return that could have been earned by investors by investing dividends in alternative investments becomes cost of retained earnings. Hence, shareholders expect a return on retained earnings at least equal to cost of equity.

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

However, while calculating cost of retained earnings, two adjustments should be made : a) Income - tax adjustment as the shareholders are to pay some income tax out of dividends, and b) adjustment for brokerage cost as the shareholders should incur some brokerage cost while investing dividend income. Therefore, after these adjustments, cost of retained earnings is calculated as :

$$K_r = K_e (1-t) (1-b)$$

Where,  $K_r$  = cost of retained earnings

$K_e$  = cost of equity

t = rate of tax

b = cost of purchasing new securities or brokerage cost.

#### Example :11

A firm's cost of equity ( $K_e$ ) is 18%, the average income tax rate of shareholders is 30% and brokerage cost of 2% is expected to be incurred while investing their dividends in alternative securities. Compute the cost of retained earnings.

$$\begin{aligned} \text{Solution : Cost of retained earnings} &= (K_r) = K_e (1-t) (1-b) = 18 (1-.30) (1-.02) \\ &= 18 \times .7 \times .98 = 12.35\% \end{aligned}$$

### 9.10 Cost of Rights Issue

Rights issue is an invitation to the existing shareholders to subscribe for further shares to be issued by a company. A right simply means an option to buy certain securities at a certain privileged price which is considerably below the market price. It is generally felt that the cost of rights issue would be different from the



cost of direct issue. But for two reasons, the real cost of rights issue would be the same as the cost of direct issue of shares to the public.

- i) the shareholder who is not interested in the rights issue, sells his right and obtains cash. Then he has the old shares plus the money obtained from selling the rights.
- ii) otherwise, the shareholder exercises his right and acquires the new shares, in addition to the old shares.

Thus, the present wealth of the shareholder in both the cases remains the same.

### 9.11 Cost of Convertible Securities :

Convertible securities or debentures are another type of instruments for mobilisation of debt capital. In this case the debentureholder is entitled to full or a part of the value of the debenture being converted into equity shares. The price at which the debenture is convertible into equity share is known as "conversion price". This conversion price is declared at the time of the issue of debentures itself.

When the bondholder exercises his option of conversion, he enjoys two benefits - interest on bonds till the date of conversion and increased market value of the shares at the time of conversion. Hence, the cost of convertible securities is taken to be that rate of discount which equates the after-tax interest and the expected market value of the share at the end of the option period, with the current market value of bond.

This is calculated with the help of following formula :

$$P_o = \sum_{t=1}^n \frac{I(1-t)}{(1+K_c)^t} + \frac{P_n(CR)}{(1+K_c)^n}$$

Where,

$P_o$  = Current market value of debenture

I - Interest

t = tax rate

$K_c$  = Rate of discount or cost of convertible security.

n = no. of years at the end of which conversion takes place.

CR = conversion ratio or the no. of shares the bond - holder gets on conversion.

### 9.12 Weighted Average Cost of Capital ( $K_o$ ) :

It is the average of the costs of various sources of financing. It is also known as composite or overall or average cost of capital.

After computing the cost of individual sources of finance, the weighted average cost of capital is calculated by putting weights in the proportion of the various sources of funds to the total.

Weighted average cost of capital is computed by using either of the following two types of weights :

- 1) Market value
- 2) Book Value

Market value weights are sometimes preferred to the book value weights as the market value represents the true value of the investors. However, market value weights suffer from the following limitations :

- i) market values are subject to frequent fluctuations.
- ii) equity capital gets more importance, with the use of market value weights.

moreover, book values are readily available.

average cost of capital is computed as follows :

$$K_w = \frac{\sum xw}{\sum W}$$

Where,  $K_w$  = weighted average cost of capital

$x$  = cost of specific source of finance

$w$  = weights (proportions of specific sources of finance in the total)

The following steps are involved in the computation of weighted average cost of capital :

- i) multiply the cost of each source with the corresponding weight.
- ii) add all these weighted costs so that weighted average cost of capital is obtained.

### Example : 12

From the following capital structure and after - tax cost for different sources of funds, compute the weighted average cost of capital of a firm

<i>Source of funds</i>	<i>Amount</i>	<i>After - tax cost of capitals</i>
Equity capital	4,50,000	0.14
Retained earnings	1,50,000	0.13
Preference share capital	1,00,000	0.10
Debentures	3,00,000	0.5
	<b>10,00,000</b>	

### Solution :

Computation of weighted average cost of capital

<i>Sources of funds (1)</i>	<i>Amount (2)</i> (Rs.)	<i>Proportion (3)</i>	<i>After - tax (4)</i>	<i>Weighted cost (5)</i> (3 x 4 = 5)
Equity capital	4,50,000	.45	14%	6.30
Retained Earnings	1,50,000	.15	13%	1.95
Preference capital	1,00,000	.10	10%	1.00
Debentures	3,00,000	.30	5%	1.50
<b>Total</b>	<b>10,00,000</b>			<b>10.75</b>

∴ Weighted average cost of capital = 10.75%

**Example :13**

Following are the details regarding the capital structure of a company :

<i>Source of funds</i>	<i>Book Value</i>	<i>Market Value</i>	<i>Secific cost of capital</i>
Debentures	Rs. 4,00,000	Rs. 3,80,000	5%
Preference Capital	Rs. 1,00,000	Rs. 1,10,000	8%
Equity Capital	Rs. 6,00,000	Rs. 12,00,000	13%
Retained Earnings	Rs. 2,00,000	-	9%
<b>Total</b>	<b>13,00,000</b>	<b>16,90,000</b>	

You are required to determine the weighted average cost of capital using (i) book value weights, (ii) market value weights.

**Solutions :**

i) Computation of weighted average cost of capital using book value weights :

<i>Source of funds (1)</i>	<i>Amount (2)</i> (Rs.)	<i>Proportion (3)</i>	<i>After-tax cost (4)</i>	<i>weighted cost (5)</i> (3 x 4 = 5)
Debentures	4,00,000	0.31	5%	1.55
Preference capital	1,00,000	0.08	8%	0.64
Equity Capital	6,00,000	0.46	13%	5.98
Retained earnings	2,00,000	0.15	9%	1.35
<b>Total</b>	<b>13,00,000</b>	<b>1.00</b>		<b>9.52</b>

Weighted average cost of capital = 9.52%

ii) Computation of weighted average cost of capital by using market value weights :

<i>Sources of funds</i>	<i>Amount</i> (Rs.)	<i>Proportion</i>	<i>After - tax</i> cost of capital	<i>Weighte cost of capital</i> (3 x 4 = 5)
Debentures	3,80,000	0.23	5%	1.15
Preference capital	1,10,000	0.07	8%	0.56
Equity capital	9,00,000	0.53	13%	6.89
Retained earnings	3,00,000	0.17	9%	1.53
<b>Total</b>	<b>16,90,000</b>	<b>1.00</b>		<b>10.13</b>

Weighted average cost of capital = 10.13%

Notes : market value of equity and retained earnings is determined in the proportion of their book values.

$$\therefore \text{market value of equity} = 12,00,000 \times \frac{6}{8} = 9,00,000$$

$$\text{market value of retained earnings} = 12,00,000 \times \frac{2}{8} = 3,00,000$$

### 9.13 Summary

Cost of capital is the minimum rate of return a firm must earn on its investments. It is a complex, controversial but a significant concept in financial management. It plays a crucial role in all the financial decisions.

Computation of cost of capital involves i) computation of specific cost of capitals and ii) weighted average cost of capital. In this lesson, we have learned the computation of cost of specific capitals, viz., equity, preference retained earnings and debt and also the weighted average cost of capital.

### 9.14 Key Words :

**Cost of capital :** The minimum rate of return, the firm must earn on its investments to maintain the market value of its shares.

**Bonds :** Long term instruments of debt capital.

**Coupon rate :** The stated rate of interest on debentures or bonds.

**Flotation costs :** The costs incurred in issuing of securities. Ex : brokerage, underwriting commission etc.

### 9.15 Self Assessment Questions / Exercises

1. What is cost of capital ? Explain the significance of cost of capital in financial decisions.
2. What is cost of capital? Explain the components of cost of capital.
3. Critically examine the different approaches for computing cost of equity.
4. What is weighted average cost of capital? Explain how it is computed.
5. Assuming that the firm pays tax at 50% rate, compute the after - tax cost of capital in the following cases :

- i) a 8.5% preference share sold at par
- ii) a perpetual bond sold at par, coupon rate of interest being 7 per cent
- iii) a ten-year 8 per cent, Rs. 1000 per bond sold at Rs. 950 less 4 per cent underwriting commission.
- iv) a Preference share sold at Rs. 100 with 9 per cent dividend, redeemable at Rs. 110 in five years.
- v) a common share selling at a current market price of Rs. 120 and paying a current dividend of Rs. 9 per share which is expected to grow at a rate of 8 per cent.
- vi) a common share of a company is selling for Rs. 50. The earnings per share is Rs. 7.50, of which sixty per cent is paid in dividends. The company reinvests retained earnings at a rate of 10 per cent.

(Hint : growth rate (g) = br; where b = retention ratio and r = return on reinvestment).

[Ans : i) 8.5%; ii) 3.5% iii) 4.36%; iv) 10.5% v) 16.1% vi) 13%]

6. From the details given below, calculate the overall cost of capital of a firm using (a) book value weights, and (b) market value weights :

<i>Sources of capital</i>	<i>Book value</i> (Rs.)	<i>Market value</i> (Rs.)	<i>After - tax-cost of capital</i> (%)
Equity share capital (Rs. 10 each)	4,50,000	9,00,000	14
Retained earnings	1,50,000	-	13
Preference capital	1,00,000	1,00,000	10
Debentures	3,00,000	3,00,000	5

[Ans : weighted average cost of capital :

a) at book value weights : 10.75%

b) market value weights : 11.44%.]

### 9.16 Further Readings

Van Horne, James C. : Financial Management

Khan M.Y. and Jain P.K. : Financial Management

Prasanna Chandra :Financial Management.

Bhalla V.K. : Finanacial Management

**Dr. J. Satyannarayana**

## LESSON - 10

**DIVIDEND THEORIES****Objective**

The objective of this lesson is to :

- \* explain the nature and significance of dividend decision
- \* to acquaint you with various theories of dividend policy

**STRUCTURE :**

- 10.1 Introduction**
- 10.2 Theory of Dividend**
- 10.3 Traditional position**
- 10.4 Walter Model**
- 10.5 Gordon Model**
- 10.6 MM Hypothesis**
- 10.7 Summary**
- 10.8 Self Assessment questions / exercises**
- 10.9 Keywords**
- 10.10 Further Readings**

**10.1 Introduction**

In the previous lessons you have been introduced the two major financial decisions viz; investment and financing decisions. Dividend decision is also an integral part of financing decision. When a company earns profits (earnings after tax and dividend on preference share capital), it has to decide as to how much of the profit should be distributed by way of dividend to the shareholders. Dividends are paid out of earnings available to the shareholders. The remaining portion of earnings are retained by the company for future purpose. These retained earnings are the internal sources of finance to the company. The policy related to dividends also indirectly means policy related to retention.

Earnings available to shareholder are equal to dividends plus retained earnings. Dividend decision is taken by the Board of Directors of the company and recommended in formal approval by the shareholders in the Annual General Body Meeting. How significant is the dividend decision? Does it affect the value (v) of the company? Does it affect the cost of capital ( $k_c$ ) of the company? If the answer to these two questions is 'yes', dividend decision is significant.

**10.2 Theory of Dividend**

You are already aware that any theory of finance deals with various variables which are supposed to have a bearing on the value of the company.

Value of a company is taken to be a function of :

- \* Investments which determine the earning power of the company (I)
- \* Debt / Equity mix (Capital structure) which decides the cost of capital to the company (F)



- \* Tax rate which determines the earnings available either for dividend distribution or retention (T)
  - \* Dividend decision which determines the amount of earnings going to the shareholders and retained by the company for future purpose (D)
  - \* Floatation costs or issue costs which are incurred by a company when it raises funds externally (f)
- $\therefore V = f [I, F, D, T, f \dots\dots\dots]$

A theory states the relationship between a dependent variable and one independent variable when other independent variables are held constant.

You must have seen that in case of capital structure theories, the value of a company is taken to be a function of capital structure (Debt/equity ratio) when other determinants or influencing variables are held constant. Similarly, in a theory of dividend the value of a company is taken to be a function of dividend decision when other influencing variables are held constant. On the question of influence of dividend decision on the value of the company and cost of capital there are the contradicting views. One view states that the dividend decision does not influence the value of a company. This school of thought holds that the dividends are irrelevant. Another school is of the view that dividends are relevant which means that the value of a company depends on the dividend decision.

Therefore, theories of dividend are two types.

- i) Dividend Irrelevance theory
- ii) Dividend Relevance theory

In the next part of the lesson we will look into various contributions made to these two schools of thought.

### 10.2.1 Relevance and irrelevance of dividend policy

Relevance of dividend policy supports the view that dividend policy has profound impact on the value of a company. There are three theories under this school of thought.

- a) Traditional view
- b) Walter model
- c) Gordon model

Irrelevance of dividend policy supports the view that dividend policy has no impact on the valuation of a company.

- d) Modigliani Miller and Merton H Miller Model

### 10.3 Traditional Theory

The traditional theory was expounded by B. Graham and D.L. Dodd. According to them,

“..... the stock market is overwhelmingly in favour of liberal dividends as against niggardly dividends.” As per this model the importance attached to liberal current dividends by the shareholders is more. Shareholders give less importance to capital gains that may arise in future. Therefore, companies which pay more current dividends will have higher market value than companies which pay less dividends.

The model is expressed in the following way.

$$P = M \left[ D + \frac{E}{3} \right] \quad (1)$$

Where

P = market price of share

D = Dividends per share

E = Earnings per share

M = Multiplier

In the above model earnings per share (E) is equal to the sum of dividend per share (D) and retained earnings per share (R)

$$\therefore E = D + R \quad (2)$$

Substitute this expression in equation. 1

$$P = M \left[ D + \frac{(D+R)}{3} \right] \quad (3)$$

On simplification,

$$P = M \left[ \frac{4D + R}{3} \right] = \left[ \frac{4}{3} D + \frac{1}{3} R \right] \quad (4)$$

The weight attached to dividends is equal to four times the weight attached to retained earnings (R). These weights provided by Graham and Dodd are based on their subjective judgement and not derived from objective analysis. According to their model liberal payout policy has favourable impact on stock price.

#### 10.4 Walter Model

James Walter also supported the view that the dividend policy of a company has an impact on the share value.

The model is based on the following assumptions :

- \* The company is an all - equity financed entity.
- \* It depends on retained earnings only to finance future investment projects.
- \* Return on investment is constant
- \* The company has perpetual life.

**Model :**

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

Where

P = Market price of share (MPS)

D = Dividend per share (DPS)

E = Earnings per share (EPS)

r = Return on investment

k = Cost of capital

(E- D) = Retained earnings.

(E-D) r= Return on retained earnings invested.

This model leads us to three situations :

- \* When return on investment (r) is greater than cost of capital (k) [ $r > k$ ] [growth company]
- \* When return on investment (r) is less than cost of capital (k) [ $r < k$ ] [declining Company]
- \* When return on investment (r) is equal to cost of capital (k) [ $r = k$ ] [normal company]

Under the first situation the return earned on retained earnings (r) is more than the return expected by the share holders (k). Therefore, shareholders would expect the company to retained earnings and pay less/nil dividends. 0% dividends /100% retention is advisable. Under the second situation the return earned on retained earnings (r) is less than the return expected by the shareholders (k). Therefore, they prefer dividend rather than retention. Hence 100% dividend payout ratio is preferable. In the third situation, the return earned on retained earnings (r) and rate expected by the shareholders (k) are equal. Therefore, shareholders would be indifferent between payment of dividends or retention of earnings. In this situation the dividend policy is irrelevant.

Let us understand the model through illustrations :

#### Illustration : 1

From the following information calculate the market value of equity share of a company using Walter's model.

Earnings per share = Rs. 5; Dividend per share = Rs. 3

Return on investment = 10%; Cost of capital = 10%

Will there be any change in the market value of equity share if the dividend payout ratio is 100% in the place of present rate of 60%.?

**Answer :** Using Walter's model the market value of the share is calculated as :

$$V = \frac{D + (E - D)r / k}{k} = \frac{3 + (5 - 3) \cdot \frac{.10}{.10}}{.10}$$

$$= \frac{3 + 2}{.10} = \frac{5}{.10} = Rs. 50.$$

If the dividend payout ratio is 100% in the place of present rate of 60% dividends per share (D) will Rs. 5. The market value of the share will be

$$V = \frac{5 + [5 - 5] \cdot \frac{.10}{.10}}{.10} = \frac{5}{0.1} = Rs. 50$$

There is no change in the market value because return on investment (r) is equal to cost of capital (k). This is a case of normal company, dividend payout ratio has no bearing on the value of the share. That is why dividend policy is irrelevant in such cases.

#### Illustration 2 :

From the following information, calculate the market value of equity share of a company using Walter's model.

E = Rs 5; D = Rs 3; r = 15%; k = 10%

Will there be any change in the value, if 100% dividends are paid instead of present 60%?

**Answer :** Market value of the share as per Walter's Model is :

$$V = \frac{D + (E - D) \frac{r}{k}}{k} = \frac{3 + (5 - 3) \frac{.15}{.10}}{.10} = \frac{3 + 2 \left[ \frac{0.15}{0.10} \right]}{0.10} = Rs. 60$$

If 100% of the earnings are paid by way of dividends, the dividend per share would be Rs. 5, then the value is :

$$V = \frac{5 + (5 - 5) \frac{.15}{.10}}{.10} = \frac{5}{0.1} = Rs. 50$$

If no dividends are paid, the value would be

$$V = \frac{0 + (5 - 0) \frac{.15}{.10}}{.10} = \frac{5 \left( \frac{.15}{.10} \right)}{.10} = Rs. 75$$

When the dividend payout ratio is 100%, the value of the share is the lowest at Rs 50 and when dividend payout ratio is 0%, the value of the share is the highest at Rs 75. This is, because the company is earning 15% rate of return on investment when the shareholders expected rate of return (k) is 10%.

If the company is a growth company, 0% dividend payout ratio is the optimum dividend policy for such companies.

### Illustration 3 :

From the following information findout the market value of equity share of a company using Walter's model.

$$E = Rs. 5; \quad D = Rs 3; \quad r = 7.5%; \quad k = 10%;$$

Will there be any change in the value of the dividend payout ratio is 100%? (that is, if D = Rs. 5)

Answer : Market value of the share as per Walter's model.

$$V = \frac{D + (E - D) \frac{r}{k}}{k} = \frac{3 + (5 - 3) \left( \frac{.075}{.10} \right)}{.10} = \frac{3 + 2 \left[ \frac{0.075}{0.10} \right]}{0.10} = Rs. 45$$

If 100% of the earnings are paid by way of dividends, the dividends per share would be Rs. 5, then the value is.

$$V = \frac{5 + (5 - 5) \left( \frac{0.075}{.10} \right)}{.10} = \frac{5}{0.1} = Rs. 50$$

If 0% dividends are paid, the value would be :

$$V = \frac{0 + (5 - 0) \left( \frac{0.075}{.10} \right)}{.10} = \frac{5 \left[ \frac{.075}{0.10} \right]}{0.10} = Rs. 37.50$$

You can observe that the value is the lowest at Rs. 37.50, when dividend payout ratio is zero and the highest at Rs. 50, when the payout ratio is 100%. This is because the company is earning 7.5% on its investments, a rate less than the shareholders expected rate of return [ $k=10\%$ ]. This is a case of declining company in which case 100% dividend payment is advisable.

<i>Nature of the Company</i>	<i>Dividend policy relevancy</i>
i. Growth company	100% Dividend payment
ii. Declining company	0% Dividend payment
iii. Normal company	Dividend policy is irrelevant.

Thus, the Walter's model puts emphasis on return on retained earnings ( $r$ ) relative to cost of capital ( $k$ ) as the critical determinant of dividend policy. Though the model suggests extreme policies like 100% dividend payout, 0% dividend payout, the model is useful under varying profitability assumptions.

### 10.5 Gordon Model

Myron Gordon proposed a model supporting the relevance of dividend policy in case of a growth company [when  $r > k$ ] and a declining company [when  $r < k$ ] and irrelevance of dividend policy in case of a normal company [when  $r=k$ ].

The model is based on the following assumptions.

- \* retained earnings represent the only source of financing
- \* return on investment is constant
- \* the growth rate of the company is the product of retention ratio ( $b$ ), and return on investment ( $r$ )  
[ $\therefore g = r.b$ ]
- \* cost of capital ( $k$ ) is constant and greater than growth rate [ $\therefore k > g$ ]
- \* company has perpetual life
- \* there are no taxes.

**Model :** 
$$P = \frac{E(1-b)}{k-br}$$

Where

$P$  = Market price of a share

$E$  = Earnings per share

$b$  = Retention ratio [percentage of earnings retained by the company]

$(1-b)$  = Dividend payout ratio

$k$  = Cost of capital [rate of return expected by the shareholders]

$r$  = return on investment

$(b.r)$  = growth rate ( $g$ )

The Gordon model is similar to Walter's model.

- \* When the rate of return ( $r$ ) is greater than cost of capital ( $k$ ), the value of a share increases as the dividend payout ratio decreases. Therefore, optimum dividend payout ratio is 0%.

- \* When the rate of return is equal to cost of capital ( $r=k$ ), the value of a share remains unchanged in response to changes in dividend payout ratio. Therefore, dividend policy is irrelevant.
- \* When the rate of return is less than cost of capital ( $r < k$ ), the value of a share increases as the dividend payout ratio increases. Therefore, 100% dividend payout ratio is optimum.

### 10.6 M-M Model :

Merton Miller and Franco Modigliani have supported the view that the value of a company is determined by its basic earning power and its risk class. According to them, the value of a company depends on asset investment policy, but not on how the company's earnings are split between dividends and retained earnings.

The model is based on the following assumptions.

- \* Capital market is perfect
- \* Investors are rational
- \* Information is freely available
- \* Transaction costs are nil
- \* Securities are divisible
- \* No investor can influence the capital market
- \* There are no floatation costs
- \* There are no corporate taxes
- \* Company's investment policy is independent of its dividend policy.
- \* Investment opportunities and future profits of companies are known with certainty.

#### Model :

If we take one year period of holding, the value of share  $P_0$  will be equal to present value of dividend paid at the end of one year ( $D_1$ ) plus present value of share price at the end of one year ( $P_1$ )

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

Total stock value will be equal to  $P_0$  multiplied by number of shares (N)

$$N \cdot P_0 = \frac{(ND_1 + NP_1)}{(1+k)} \quad (2)$$

If the company sells 'M' number of shares at price ' $P_1$ ' at the end of one year, it brings  $MP_1$  of rupees of capital. These new shares will not receive any dividend.

We can add  $MP_1$  and subtract  $MP_1$  to the numerator of equation 2, the value will not change.

$$NP_0 = \frac{ND_1 + NP_1 + MP_1 - MP_1}{(1+k)} \quad (3)$$

$$NP_0 = \frac{ND_1 + (N+M)P_1 - MP_1}{(1+k)} \quad (4)$$



Current value of stock is equal to the present value of dividends plus the stock value at the end of one year minus the value of new stock belonging to the new share holders.

If we assume that the company's net income during the year is 'X' and its total new investment during the year is 'I' and it does not use debt, the sources and uses of funds at the end of one year will be as follows.

<i>Sources of funds</i>	<i>Uses of funds</i>
New share capital ( $MP_1$ )	New Investment (I)
Net Income (X)	Dividends ( $ND_1$ )

Sources of funds are equal to uses of funds.

sources of funds = uses of funds

$$MP_1 + X = I + ND_1 \quad (5)$$

$$MP_1 = I + ND_1 - X \quad (6)$$

Now, substitute equation 6 into equation 4

$$NP_o = \frac{ND_1 + (N + M)P_1 - [I + ND_1 - X]}{(1 + k)} \quad (7)$$

$$NP_o = \frac{ND_1 + (N + M)P_1 - I - ND_1 + X}{(1 + k)} \quad (8)$$

$$NP_o = \frac{(N + M)P_1 - I + X}{(1 + k)} \quad (9)$$

Equation 9 presents MM's basic expression of current value of a company. From the equation we can understand that value of a company is dependent upon its net income, the investment, the amount of capital and cost of capital. But the value is not influenced by the dividends.

MM argue that any gain in stock value resulting from an increase in dividends is exactly offset by a decrease in the stock value as a result of fall in the stock end of period value ( $P_1$ ). MM believe that the share holders received income either by way of dividends ( $D_1$ ) or capital gain which is the difference between current price ( $P_o$ ) and price at the end of the period ( $P_1$ ). According to them the share holders are indifferent between current dividend or capital gain. Therefore, dividend policy is irrelevant.

**Illustration :** A chemical company currently has 1,00,000 equity shares selling at Rs. 100 each. The company expects to earn a net income of Rs. 10,00,000 during the current year and is contemplating to declare a dividend of Rs. 6 per share at the end of the current year. It has a proposal for a new investment of Rs. 20,00,000, the company's cost of capital (k) is 10%. Illustrate with the help of MM model that payment of dividend does not matter.

**Answer :** We know that current value of stock is  $P_o$ ; the present value of dividends at the end of one year ( $D_1$ ) and price of stock at the end of one year ( $P_1$ ).

$$P_o = \frac{(D_1 + P_1)}{(1+k)} \quad (1)$$

from this equation we can solve  $P_1$  as follows.

$$P_1 = P_o (1+k) - D_1 \quad (2)$$

**Situation 1** - When dividends of Rs. 6 per share are declared.

$NP_o$  = old capital = 1,00,000 shares x Rs. 100 = Rs. 10000000

$X$  = Net income = Rs. 10,00,000

$I$  = New Investment = Rs. 20,00,000

$ND_1$  = Dividend = (Rs. 6) x 100000 shares = Rs. 6,00,000

$MP_1$  = New capital required = Rs. 16,00,000

From equation (2) we can find  $P_1$

$$P_1 = P_o (1+K) - D_1 = 100 (1+10\%) - 6 = \text{Rs. } 104$$

$$\begin{aligned} \text{Number of New shares} &= \frac{\text{New Capital Required}}{\text{Price of New shares}} = \frac{I - D}{P_1} \\ &= \frac{1600000}{104} = \frac{800000}{52} = \frac{200000}{13} \end{aligned}$$

$$\begin{aligned} \text{Value of Stock} &= \frac{(N + M)P_1 - I + x}{1 + k} \\ &= \frac{\left[ 100000 + \frac{200000}{13} \right] 104 - 2000000 + 100000}{(1 + 0.1)} \\ &= \text{Rs. } 1,00,00,000 \end{aligned}$$

**Situation 2** : When dividends are not declared

$N = 100000$  shares.       $X = \text{Rs. } 10,00,000$        $I = \text{Rs. } 20,00,000$

$k = 10\%$        $D_1 = 0$

$$P_1 = P_o (1+k) - D_1 = 100 (1+10\%) - 0 = \text{Rs. } 110.$$

$$\text{Number of New shares (M)} = \frac{I - D}{P_1} = \frac{2000000}{110} = \frac{200000}{11}$$

$$\text{Value of Stock} = \frac{(n + m)p_1 - I + x}{1 + k}$$

$$= \frac{\left[ 100000 + \frac{200000}{11} \right] 110 - 200000 + 1000000}{[1 + 0.1]} = \text{Rs. } 1,00,00,000$$

∴ value of stock remained unaffected by dividend policy.

## 10.7 Summary

In this lesson we have seen the contradicting views on the impact of dividend decisions on the value of a company (v) and its cost of capital (k). Traditional view, which is not supported by any empirical evidence, suggested liberal dividend policy to enhance the value of company. Walter and Gordon models categorised companies into three groups a) Normal b) Growth c) Declining and suggested (i) 100% pay out policy for a declining company, (ii) 100% retention policy (zero dividends) for a growth company, and (iii) indifference of dividend policy for normal company. Finally, the MM Model is of the view that value of a company is independent of its dividend policy. Some empirical studies conducted by Lintner, John Brittain, Purnanandam etc. came up with a conclusion that dividends are relevant in influencing the value of a company.

## 10.8 Self Assessment Questions :

1. Critically examine traditional position of Graham and Dodd - relating to dividend policy.
2. Explain the dividend irrelevance theory of Miller - Modigliani (MM)
3. Explain fully Walter's model of dividend policy.
4. Examine Gordon's views on relevance of dividend policy.
5. A chemical company has a cost of capital of 12%. The current market value of the company is Rs. 30 lakhs @ Rs. 30 per share. Earnings are Rs. 5 lakhs. New investment is Rs. 9 lakhs. Dividends are Rs. 3 lakhs. Show that [under MM assumption] the payment of dividend does not affect the value of the company.
6. You are provided with the following particulars related to a company. You have to ascertain whether the dividend pay out ratio of the company is optimal (Using Walter's model)

Equity Capital = Rs. 40,00,000 (number of shares 4,00,000)

Earnings of the Company = Rs. 5,00,000

Dividends paid = Rs. 2,75,000

Price - Earnings (P/E) ratio = 12.5

The company is expected to maintain its current rate of earnings on investment

[Hints : cost of equity is the reciprocal of P/E ratio.  $K_e = \frac{1}{P/E \text{ ratio}} = 8\%$ .

$$\text{Return on investment (r)} = \frac{E}{\text{Equity}} = \frac{\text{Rs. } 5,00,000}{\text{Rs. } 4,00,0000} = 12.5\%$$

**10.9 Keywords :**

1. **P/E ratio :** The ratio of market price per share to earnings per share. Reciprocal of P/E ratio is cost of equity ( $K_e$ ).
2. **Dividend :** The portion of company's net earnings which are paid out to the shareholders.
3. **Dividend payout ratio** = Ratio of Dividends to Earnings [ratio of DPS to EPS.]

**10.10 Further Readings**

Van Horne, James C. : Financial Management

Khan M.Y. and Jain P.K. : Financial Management

Prasanna Chandra : Financial Management.

Bhalla V.K. : Financial Management

## UNIT - 10

**DIVIDEND THEORIES****Objectives**

The objectives of this unit are to :

- \* to acquaint you with various theories of dividend
- \* to

**STRUCTURE :**

- 10.1 Introduction**
- 10.2 Theory of Dividend**
- 10.3 Traditional position**
- 10.4 Walter's Model**
- 10.5 Dardan Model**
- 10.6 MM Hypothesis**
- 10.7 Summary**
- 10.8 Self Examination questions / exercises**
- 10.9 Glossary**

**10.1 Introduction**

In the previous lessons you have been introduced to the two major financial decisions viz; Investment decision and financing Decision. Dividend decision is also integral part of financing decision. When a company earns profits (Earnings after tax and dividend on preference share capital), it has to decide as to how much of the profit should be distributed by way of dividend to the shareholders (owners of the company). Dividends are paid out of earnings available to shareholders. The remaining portion or earnings are retained by the company for future purpose. These retained earnings are the internal sources of finance to the company the policy related to dividends also indirectly means policy related to retention.

Earnings Available to SHs = Dividends + Retained Earnings. Dividend decision is taken by the Board of Directors of the company and recommended in Annual approval by the shareholders the Annual general meeting (AGM). How significant is the dividend decision? Does it affect the value (v) of the company? Does it affect the cost of capital (k<sub>o</sub>) of the company? If the answer to these two questions is yes, dividend decision is significant.

**10.2 Theory of Dividend**

You are already aware that any theory of finance deals with various variables which are supposed to have a bearing on the value of the company.

Value of a company is taken to be a function of

- \* Investments which deals the earning power of the company (I)
- \* Debt / Equity mix (Capital structure) which deals the cost of capital to the company (F)
- \* To rate which determines the earnings available either for dividend distribution or retention (T)
- \* Dividend decision which determines the amount of earnings going to the shareholders and amount of

erings retained by the company in tuturo purpose (D)

\* Floatation costs or issue costs which are recurred by a company when it raises funds externally (F)

$\therefore V = f [I, F, D, T, F\text{-}.....]$

A theory states the relationship between a dependent variable and one independent variable when other independent families are held constant.

Your must have seen that in the case of capital structure theories, the ralco of a company is taken to the a funation of capital structure (Dept/equity ratio) when determints or influencing variables are held constant. Smilarly in a theory of dividend the value of a company is taken to be a funation of dividend deasion when other influencing variables are held constant. On the question of influence of dividend decision on the value of the company and cost of capital there are the contradicting weas. One view state that the dividend deasion doesnt influence the value of company. This school of thought hads that the dividends are Irrelevant. Another school is of the view that dividends are relevant whide means that the value of a company depends on the dividend decision.

Therefore, theories of dividend are two types.

- 1) The dividend Irrelevance theory's
- 2) The dividend relevance theory.

In the next part of the lesson we will lode rule various contributions made to these two schools of thought.

### 10.2.1 Relevance and irrelevance of dividend policy

Relevance of devidend policy supports the view that dividend policy has preford impact on the value of a company. There are three theories under this school of thought.

- a) Traditional Theory
- b) Walter model
- c) Garden model

Irrelevance of dividend policy supports the view that dividend policy has no impact on the valuation of a company d) Modigliani and Miller Model.

### 10.3 Traditional Theory

The traditional theory was expounded by B. Graham and D.L. Dodd. Accordig to them.

“..... the stock market is over whelningly the favour of liberal dividends as against niggarddly dividends.” As per this model the importance attached to liberal current devidends by the shareholders is more. Share holders give less importance to capital gains that may arise thrfuturo. Therefore, companies which pay more current dividends will have higher market value than companies which pay less dividends.

The model is eopressed in the following way.

$$P = M \left[ D + \frac{E}{3} \right]$$

Where P = market price of share

D = Dividends per share

E = Earnings per share

m = Multiplies



In the above model Earnings per share (e) are equal to the sum of dividend per share (D) and Retained Earnings per share (R)

$$\therefore E = D + R$$

Substitute this expression in equation. 1

$$P = m \left[ D + \frac{D+R}{3} \right]$$

On simplification,

$$P = m \left[ \frac{4D+R}{3} \right] = \left[ \frac{4}{3} D + \frac{1}{3} R \right]$$

The weight attached to dividends is equal to four times the weight attached to retained earnings (R). These weights provided by Graham and Dodd are based on their subjective judgement and not derived from objective analysis according to their model liberal payout policy has favorable impact on stock price.

#### 10.4 Walter Model

James Walter also supported the view that the dividend policy of a company has an impact on the share value. His model is based on the following assumption.

##### Assumption :

- \* The company is an all - equity financed entity.
- \* It depends upon only retained earnings to finance future investment projects.
- \* Return on investment is constant
- \* The company has perpetual life.

##### Model :

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

Where P = Market price of share (MPS)

D = Dividend per share (DPS)

E = Earnings per share (EPS)

R = Return on investment

K = Cost of capital

E- P = Retained earnings.

(E-D) r = Return on retained earnings invested.

This model leads us to three situations.

- \* When return on investment (r) is greater than cost of capital (k) [r > k] [Growth company]
- \* When return on investment (r) is less than cost of capital (k) [r < k] [Declining Company]
- \* When return on investment (r) is equal to cost of capital (k) [r = k] [n and firm]

Under the first situations the return earned on retained earnings ( $r$ ) is more than the return expected by the share holders ( $k$ ). Therefore shareholders would expect the company to retain earnings and pay less dividends, therefore, 0% dividends 100% retention is advisable under the second situations the return earned on retained earnings ( $r$ ) is less than the return expected by the shareholders ( $k$ ). Therefore they prefer dividend rather than retention 100% dividend payment ratio is preferable.

In the case of third situation, the return earned on retained earnings ( $r$ ) and that located by the shareholders ( $k$ ) are equal there shareholders would be indifferent between payment of dividends or retention of earnings. In this situation the dividend policy is irrelevant. Let us understand the model through illustrations.

**Illustration : 1.** From the following information calculate the market value of equity share of a company using Walter's mode.

Earnings per share = Rs. 5 Dividend per share = Rs. 3

Return on investment = 10% Cost of capital = 10%

Will there be any change in the market value of equity share if the dividends payment ratio is 100% in the place of present 60%.

**Answer :** Using Walter's model the market value of the share is calculated.

$$V = V = \frac{D + (E - D)r / k}{K} = \frac{3 + (5 - 3) \frac{10\%}{10\%}}{10\%}$$

$$= \frac{3 + 2}{10\%} = \frac{5}{0.1} = Rs. 50.$$

If the dividend payment ratio is 100% in the place of present rate of 60% dividends per share ( $D$ ) will be Rs. 5. The market value of the share will be

$$V = V = \frac{5 + [5 - 5] \frac{10\%}{10\%}}{10\%} = \frac{5}{0.1} = Rs. 50$$

There is no change the market value. This is because return on investment ( $r$ ) is equal to cost of capital ( $k$ ). This is a case of normal company. Dividend payment ratio has no bearing on the value of the share. That is why dividend policy is irrelevant per such cases.

**Illustration 2 :** From the following information calculate the market value of equity share of a company using Walter's mode.

$E = Rs 5, D = Rs 3, M = 15\% K = 10\%$

Will there be any change in the value if 100% dividends are paid instead of present 60%.

**Answer :** Market value of the share as per Walter's Model.

$$V = \frac{D + (E - D) \frac{r}{k}}{k} = \frac{3 + (5 - 3) \frac{15\%}{10\%}}{10\%} = \frac{3 + 2 \left[ \frac{0.15}{0.10} \right]}{0.10} = Rs. 60$$

If 100% of the Earnings are paid by way of dividends the dividend per share would be Rs. 5, then the value is

$$V = \frac{5 + (5 - 5) \frac{15\%}{10\%}}{10\%} = \frac{5}{0.1} = Rs.50$$

If no dividends are paid, the value worked be

$$V = \frac{0 + (5 - 0) \frac{15\%}{10\%}}{10\%} = \frac{5 \left( \frac{15\%}{10\%} \right)}{10\%} = Rs.75$$

When the dividend payment ratio is 100% the value of the share is the lowest at Rs 50 and when dividend payment ratio is 0% the value of the share is the highest at Rs 75. This is because the company is earning 15% rate of return on investment when the shareholders expected rate of return (cost of Capital k) is 10%. The company is a growth company. 0% dividend payment ratio is the optimum dividend policy for such companies.

**Illustration 3 :** from the following information find out the market value of equity share of a company using Walter mode.

$$E = Rs. 5 \quad D = Rs 3 \quad r = 7.5\% \quad k = 10\%.$$

will there be any change in the value if the dividend payment ratio is 10%. that is if D = Rs. 5.

Answer : Market value of the share as per walter model.

$$V = \frac{D + (E - D) \frac{r}{k}}{10\%} = \frac{3 + (5 - 3) \left( \frac{7.5\%}{10\%} \right)}{10\%} = \frac{3 + 2 \left[ \frac{0.075}{0.10} \right]}{0.10} = Rs.45$$

If 100% of the earnings are paid by way of dividends the dividends per share would be Rs. 5 then the value is.

$$V = \frac{5 + (5 - 5) \left( \frac{7.5\%}{10\%} \right)}{10\%} = \frac{5}{0.1} = Rs.50$$

If 0% dividends are paid the value would be

$$V = \frac{0 + (5 - 0) \left( \frac{7.5\%}{10\%} \right)}{10\%} = \frac{5 \left[ \frac{.075}{0.10} \right]}{0.10} = Rs.37.50$$

You can observe that the value is the lowest at Rs. 37.50 when dividend payment ratio is zero and the highest at Rs. 50 when the payment ratio is 100%. This is because the company is earning 7.5% on its investments, a ratio less than the share holders expected rate of return [k=10%]. This is a case of declining company. In cases of this type 100% dividend payment is advisable.

### ***Nature of the Company***

1. Growth Company
2. Declining company
3. Normal company

### ***Dividend policy relevant***

- 100% Dividend payment  
0% Dividend payment  
Dividend policy is irrelevant.

Thus, the Walter's model puts emphasis on return on retained earnings (r) relative to cost of capital (k) as the critical determinant of dividend policy.

Though model suggests extreme policies like 100% dividend payment 0% dividend payment, the model is useful under varying profitability assumptions.

### 10.5 Gordon Model

Mysor Gordon proposed a model supporting the relevance of dividend policy in case of a growth company [when  $r < k$ ] and a declining Company [when  $r < k$ ] and irrelevance of dividend policy in case of a normal company [when  $r = k$ ]. The model is based on the following assumptions.

#### Assumptions :

- \* Retained earnings represent the only source of financing
- \* Return on investment is constant
- \* The growth rate of the company is the product of retention ratio (b) and return on investment (r)  
[  $\therefore g = r.b$  ]
- \* Cost of capital (k) is constant and greater than growth rate [  $\therefore k < g$  ]
- \* Company has perpetual life
- \* There are no taxes.

**Model :** 
$$P = \frac{E(1 - D)}{K - Dr}$$

P = market price of a share

E = Earnings per share

b = retention ratio [percentage of earnings retained by the company]

1-b = Dividend payment ratio

k = Cost of capital [ratio of return expectedly the shareholder]

r = return on investment

b.r = growth rate (g)

The Gordon model is similar to Walter's model.

When the rate of return (r) is greater than cost of capital (k), the value of a share increases as the dividend payout ratio decreases. Therefore optimum dividend payout ratio is 100%.

- \* When the rate of return is equal to cost of capital ( $r = k$ ) the value of a share remains unchanged in response to changes in dividend payment ratio. Therefore, dividend policy is irrelevant.
- \* When the rate of return is less than cost of capital ( $r < k$ ) the values of a share increases as the dividend payment ratio increases. Therefore, 100% dividend payment ratio is p.

### 10.6 M M Model :

Merton Miller and Franco Modigliani have supported the view that the value of a company is determined by its basic earning power and its risk class. According to them the value of a company depends on asset

investment policy but not on how the company's earnings are split between dividends and retained earnings. The model is based on the following assumptions.

**Assumptions :**

- \* Capital market is perfect
- \* Investors are rational
- \* Information is freely available
- \* Transaction costs are nil
- \* Securities are divisible
- \* No investor can influence the market
- \* There are no flotation costs
- \* There are no taxes
- \* Company's investment policy is independent of its dividend policy.
- \* Investment opportunities and future profits of companies are known with certainty.

**Model :**

If we take one year period of holding, the value of share will be equal to present value of dividend paid at the end of one year ( $D_1$ ) plus present value of share price at the end of one year ( $P_1$ )

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

Total stock value will be equal to  $P_0$  multiplied by number of shares ( $n$ )

$$N \cdot P_0 = \frac{ND_1 + NP_1}{(1 + K)}$$

If the company sells 'm' number of shares at price ' $P_1$ ' at the end of one year it brings  $mP_1$  of rupees of capital. These new shares will not receive any dividend.

We can add  $MP_1$  and subtract  $MP_1$  to the number of equation 2 the value will not change.

$$NPO = \frac{ND_1 + NP_1 + MP_1 - MP_1}{(1 + K)}$$

$$NPO = \frac{ND_1 + (N + M)P_1 - MP_1}{(1 + K)}$$

Current value of stock is equal to the present value of dividends plus the stock value at the end of one year minus the value of new stock belonging to the new share holders.

If we assume that the company's net income during the year is 'x' and its total new investment during the year is 'I' and it does not use bet. the sources and uses of funds at the end of one year will be as follows.

Sources of funds

New share capital ( $MP_1$ )

Net Income (N)

Uses of funds

New Investment (I)

Dividends ( $ND_1$ )

Sources of funds are equal to uses of funds.

Sources of funds = uses of funds

$$MP_1 + x = I + ND_1$$

$$MP_1 = I + ND_1 - X$$

Now, substitute equation 6 in to equation

$$NPO = \frac{ND_1 + (N + M)P_1 - [I + ND_1 - X]}{(1 + K)}$$

$$NPO = \frac{ND_1 + (N + M)P_1 - I + ND_1 - X}{(1 + K)}$$

$$NPO = \frac{(N + M)P_1 - I + X}{(1 + K)}$$

Equation 9 presents MM's basic expression of current value of a company. From the equation we can understand that value of a company is dependent upon its net income, the investment, the amount of capital and cost of capital. But the value is not neglected by the dividends. MM argue that any gain in stock value resulting from an increase per dividends is exactly offset by a decrease in the stock value as a result of for in the stock end of period value ( $P_1$ ). MM believe that the share holders received income either by way of dividends ( $D_1$ ) or capital gain which is the difference between current price ( $P_0$ ) and price at the end of the period ( $P_1$ ). According to them the share holder are indifferent between current dividend or capital gain. Therefore dividend policy is irrelevant.

**Illustration :** A chemical Company currently has 10,000 equity shares selling at Rs. 10 each. The company expects to earn a net income of Rs. 10,00,000 during the current year and is contemplating to declare a dividend of Rs. 6 per share at the end of the current year. It has a proposal for a new investment of Rs. 20,00,000 the company's cost of capital ( $k$ ) is 10%. Illustrate with the help of MM model that payment of dividend does not matter.

**Answer :** We know that current value of stock ( $P_0$ ) is the present value of dividends at the end of one year ( $D_1$ ) and price of stock at the end of one year ( $P_1$ ).

$$P_0 = \frac{D_1}{1 + K}$$

from this equation we can solve  $P_1$  as follows.

$$P_1 = P_0(1+k) - D_1$$

**Situation 1** - when dividends of Rs. 6 per share are declared.

$NP_0 =$  old capital = 10,000 shares x Rs. 100 = Rs. 10000000

x - Net income = Rs. 10,00,000



I New Investment = Rs. 20,00,000

ND<sub>1</sub> Dividend = Rs. 6 x 100000 shares = Rs. 6,00,000

MP<sub>1</sub> = New Capital required = Rs. 16,00,000

From the (2) we can found P<sub>1</sub>

$P_1 = P_0 (1+K) - D_1 = 100 (1+10\%) - 6 = \text{Rs. } 104$

$$\begin{aligned} \text{No. of New shares} &= \frac{\text{New Capital Required}}{\text{Price of New shares}} = \frac{I - D}{P_1} \\ &= \frac{1600000}{104} = \frac{800000}{52} = \frac{200000}{13} \end{aligned}$$

$$\begin{aligned} \text{Value of Stock} &= \frac{(N + M)P_1 - I + \chi}{1 + K} \\ &= \frac{[100000 + \frac{200000}{13}] 104 - 2000000 + 100000}{(1 + 0.1)} \end{aligned}$$

**Situation 2 :** When dividends are not declared

n = 1000000 shares.    x = Rs. 10,00,000    I = Rs. 20,00,000

k = 10%    D<sub>1</sub> = 0

$P_1 = P_0 (1+K) - D_1 = 100 (1+10\%) - 0 = \text{Rs. } 110.$

$$\begin{aligned} \text{No. of New shares (m)} &= \frac{(n + m)p_1 - I + x}{1 + k} \\ &= \frac{[100000 + \frac{200000}{11}] 110 - 200000 + 1000000}{[1 + 0.1]} = \text{Rs. } 100,00,000 \end{aligned}$$

\ Valued / stock remined unaspected by dividend policy.

## 10.7 Summary

In this lesson we have seen the contradicting valeus on the impact of dividend decisions on the value of a company (v) and its cost of capital (k) traditional veiws, which is not supported by any empirical evidence, suggested liberal dividend policy to enhance the value of a company. Walter's and Gordian's Models categories companies into three groups a) Narmal b) Growth c) Decliming and suggested 1) (100% pay out policy for a decliming company, (ii) 100% retentian policy (zero dividends) for a growth company and iii) indifference of dividend policy for normal company. Finally, the MM Model is of the view that value of a company is independent of its dividend policy. Some empiricl studies conducted by Lintner, John Brittain, Puruanandam etc. came up to the a conclusion that dividends are relevant in influency the value of a company.

**10.8 Self examination questions :**

1. Critically examined tradition position of Graham and Dodd - relating to dividend policy.
2. Explain the dividend irrelevance theory of Miller - Modigliani (MM)
3. Explain fully Walter's model of dividend policy.
4. Examine Gardans views on relevance of dividend policy.
5. An chemical company has a cost of capital of 12%. The current market value of the company is Rs. 30 lakhs @ Rs. 30 per share. Earnings are Rs. 5 Lakhs. New investment is Rs. 9 lakhs. Dividends are Rs. 3 lakhs. Show that [under MM assumption] the payment of dividend does not affect the value of the company.
6. You are provided with the following particulars related to a company. You have to ascertain whether the dividend payart ratio of the company is optima (Using Walter's model)

Equity Capital = Rs. 40,00,000 (number of shares 4,0000)

Earnings of the Company = Rs. 5,00,000

Dividends paid = Rs. 2,75,000

Price = Earnings (P/E) ratio = 12.5

The company is expected to maintain its current ratio of earnings on investment [Hints : cost of equity

is the reciprocal of P/E ratio.  $K_e = \frac{1}{P/E \text{ ratio}} = 8\%$ .

Return as investment = (r)  $\frac{E}{Equity} = \frac{Rs. 500000}{Rs. 4000000} = 12.5\%$

**10.9 Glossary**

1. **P/E ratio** : The ratio of market price per share to earnings per share. Recipsocal of P/E ratio is cost of equity (ke).
2. **Dividend** : The portain of company's net earnings which are paid out to the shareholders.
3. **Dividend payment ratio** = Ratio of Dividends to Earnings ratio of DPS to EPS.



## LESSON - 11

**DIVIDEND POLICIES****Objectives**

The objectives of the lesson are to present :

- \* the factors affecting the dividend decision
- \* the types of dividend policies followed by companies
- \* the various forms of dividend.

**STRUCTURE :**

- 11.1 Introduction**
- 11.2 Determinants of Dividend policy**
- 11.3 Dividend policies of companies**
- 11.4. Forms of Dividend**
- 11.5 Summary**
- 11.6 Key words**
- 11.7 Self Assessment questions / exercises**
- 11.8 Further Readings**

**11.1 Introduction**

In the previous lesson you have been introduced to the relevance and irrelevance of dividend decision in the determination of the value of a company. Various theories were proposed under a set of assumptions. Given the imperfections prevailing in the real world, a company cannot treat its dividend policy irrelevant. It must carefully analyse the environment in which it is operating and take into consideration various factors that have a bearing on its valuation. Realising the importance of dividend policy, this lesson covers the important dimensions of dividend policy, discusses the factors relevant for formulating the dividend policy and policy relating to stock split, bonus issues, stock repurchase, etc.,

**11.2 Determinants of Dividend policy**

Dividend policy determines the distribution of earnings available to shares or earnings per share between dividend payment and retention.

Therefore earnings per share is equal to dividend per share plus retention per share. This break up must be carefully decided keeping in view various factors, which are discussed below :

**11.2.1. External Factors :** External factors are those factors which are uncontrollable, which can not be influenced by decisions. Financial manager has to adopt his policies whenever there is a change in these factors.

**i) General state of the economy :** The general state of the economy in which the company operates has a great impact on dividend policy. If the economy is passing through boom or prosperity all the

businesses will be expanding showing good financial results. Market price of shares rise rapidly. Companies need funds for expansion or diversification and therefore many prefer to retain profits instead of approaching the capital market for funds. During recession, business face problems of contracting sales, mounting inventories, decreasing profits etc. If the recession persists, businesses have to cut down the production capacities. The market price of shares continue to fall. Companies must make a logical balance between dividends and retentions to stabilise the market price.

**ii) State of the capital market :** The factor is related to a company's access to the capital market. If the capital market is overwhelmingly in favour of equity issue, then the companies may adopt liberal dividend policy. At times when funds are required companies access the capital market instead of generating internal funds through retention.

**iii) Legal Restrictions :** Dividend policy is governed by restrictions imposed by certain laws. For example, as per the provisions of the Companies Act, 1956 dividend can be declared only after providing for depreciation and any company providing for more than 10% dividend is required to transfer a certain percent of profits to reserves.

**iv) Tax Policy :** According to the provisions of the Income Tax Act, any domestic company distributing dividend has to pay additional tax on distributed profits at a rate of 12.5% (plus surcharge) in addition to normal tax rate of 35% (plus surcharge). In the hands of the shareholders, dividend is not a taxable income and the longterm capital gain arising out of sale of shares is taxable at a flat rate of 20%.

**v) Requirements of institutional investors :** Dividend policy of a company is affected by the requirements of institutional investors such as financial institutions, banks, insurance companies, mutual funds etc. These investors usually favour a policy of regular payment of dividends.

### 11.2.2. Internal Factors :

**i) Nature of Business :** Nature of business is an important factor which influences the dividend policy. Any company engaged in the production with steady demand which is not influenced by variations in business cycles can follow a liberal dividend policy. These are the various factors which are controllable by taking Companies with seasonal whereas, or cyclical variations in their demand for product cannot follow liberal dividend policy. They adopt a cautious approach.

**ii) Composition of the shareholders :** Composition of shareholders influence current income requirements of shareholders. If the shareholders belong to low income brackets or retired persons the expectation for a regular dividend will be more. Which influences the dividend policy.

**iii) Alternative uses of funds :** If the shareholders have alternative uses of the funds they would prefer the company to declare dividends so that they can invest the dividend amounts in the alternative opportunities.

**iv) Future Requirements of the company :** Companies having profitable ventures on hand, or companies having plans for future expansions, diversifications etc prefer to retain earnings by adopting a low dividend payout ratio.

**v) Control :** If a company adopts a liberal dividend policy, it may have to access the capital market through a fresh issue of shares. This may dilute the control of the existing shareholders, as the proportion of their shareholding decreases with every fresh issue of shares. If the existing shareholders do not like to dilute their control, they would prefer low dividend payout.

**vi) Desire for financial solvency and liquidity :** The dividend policy of a company is influenced by a company's need for liquid funds for meeting working capital requirement. It depends upon the credit standing of a company.

### 11.3 Dividend policies of companies :

In the previous section of this lesson we have analysed various factors that influence the dividend policy of a company. In this part we will look into various alternative dividend policies.

**11.3.1. Stable Rupee Dividend :** Payment of a fixed amount per share as dividend is one of the dividend policies followed by companies. This payment is not influenced by the companies earnings. Fluctuation in earnings will have no influence on dividend.

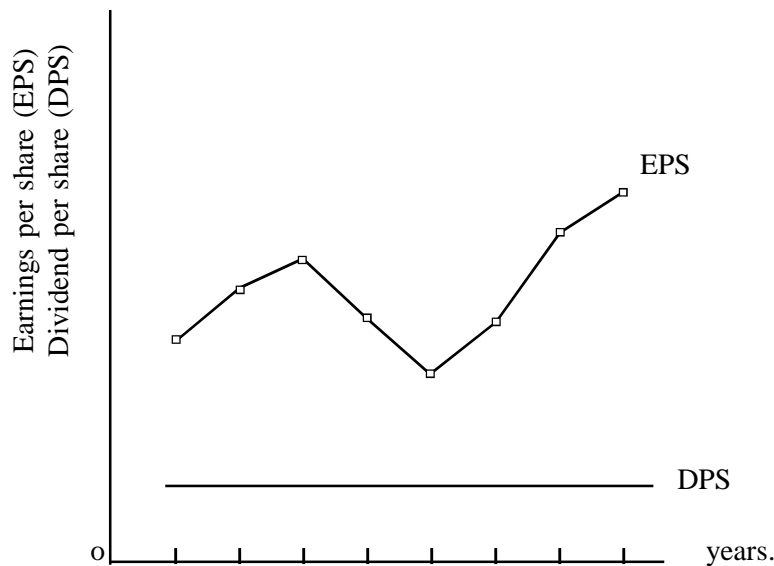


Fig. 11.1 Stable Rupee dividend policy

Dividends as percentage of paid-up capital is fixed. If the parvalue of the equity share is Rs. 10. and if the company maintains a stable rupee dividend policy for example a rate of 30%, the dividend per share would amount to Rs. 3. This amount will be maintained even if there are changes in earnings per share (EPS).

This policy is simple and easy to follow when the company's earnings are stable and steady. But if the earnings fluctuate widely, it is difficult to maintain fixed rupee dividend or fixed rate on paid-up capital.

**11.3.2. Relatively stable rupee level of dividends which steadily trends upward :** As the shareholders expect a growth in the dividends they receive, companies maintain fixed rupee dividend but shows an upward trend in dividends. This policy also does not have any relationship to the earnings per share.



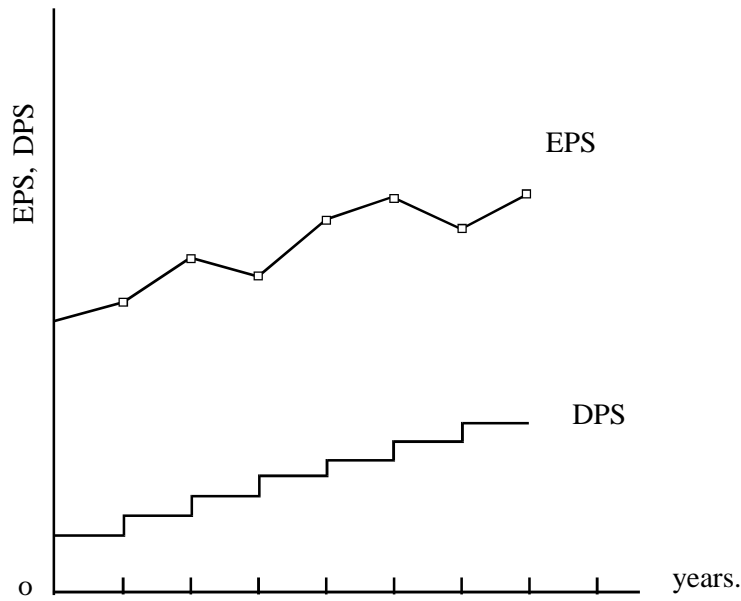


Fig 11.2 : Stable rupee dividend - upward trend.

This policy is suitable in the case of companies which experience a steady progression in its earnings. But companies experiencing wide fluctuation in their earnings find it difficult to adopt this policy.

**11.3.3. Stable Dividend payout Ratio :** Dividend payout ratio is the ratio of dividends to earnings.

$$\text{Payout ratio} = \frac{\text{Dividends per share (DPS)}}{\text{Earnings per share (EPS)}}$$

Under this policy dividends fluctuate with earnings.

Some companies follow the policy of constant payout ratio which is a fixed percentage of earnings.

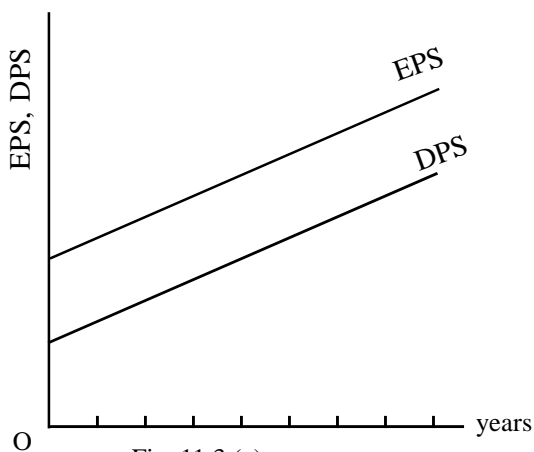


Fig. 11.3 (a)

Stable dividend payout ratio

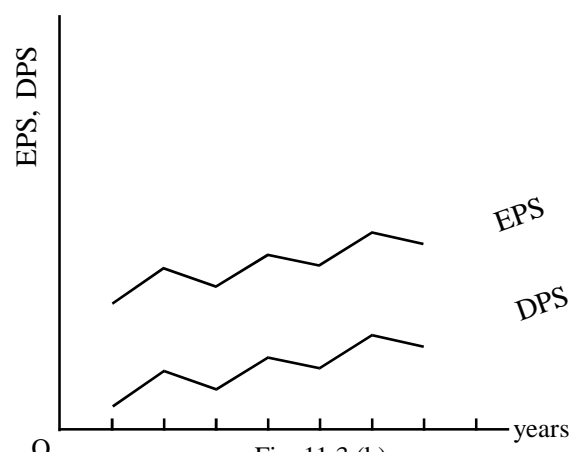


Fig. 11.3 (b)

Stable dividend payout ratio

Suppose, a company decides to pay 40% of the earnings as dividends every year. In a year when the earnings per share are Rs. 4, dividend per share would be Rs. 1-60. and in another year when EPS is Rs. 5, DPS would be Rs. 2.

This policy does not put pressure on companies when they incur losses. Dividend will be paid only when there are profits. This policy automatically decides the retention policy of the company. If 40% is the payout ratio, remaining 60% is the retention ratio.

**11.3.4. Residual dividend policy :** Residual dividend policy supports the dividend irrelevance theories. Dividend policy is influenced by both investment opportunities and availability of funds to finance these opportunities. This dividend policy is called residual because a company first determines the capital budget (investment decision) and the amount of capital required to finance the project (financing decision). Then decides the amount of dividend paid (dividend decision) based on the remaining earnings.

The company follows the following steps in the residual dividend policy.

Step : i) determination of optimum capital budget.

ii) assessment of capital required to finance that budget

iii) use retained earnings to the extent possible to finance the project.

iv) payment of dividend only if more earnings are available than needed to support the optimal capital budget.

Dividends are merely a residual remaining after all equity investments needs are satisfied. Residual dividend policy may be : (i) pure residual, dividend policy (or) (ii) smoothed residual dividend policy.

**i) Pure Residual Dividend Policy :** Pure residual dividend policy requires a company to distribute by way of dividends whatever earnings remain after meeting the equity requirement of the capital budget. Under this policy whenever there is a change in the earnings or capital requirement, dividend amount also changes. More fluctuations in the dividend may not be liked by majority of the shareholders, since shareholders expect stable dividend with growth.

The following example explains the pure residual dividend policy.

**Table 11.1 Pure Residual dividend policy**

(as in crores)

<i>Period</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>Total</i>
Earnings	150	190	140	220	280	250	290	1520
Capital budget	140	160	180	200	220	260	270	1430
Equity investment	70	80	90	100	110	130	135	715
Pure Residual Dividend	80	110	50	120	170	120	155	805

In period 1 when earnings were Rs 150 crores the capital budget was to be a tune of Rs. 140 Crores. Out of the total capital budget equity contribution is 50 per cent i.e. Rs. 70 crores. After meeting equity investment, the earnings left are Rs. 80 crores. These residual earnings are declared as dividends. If this policy is adopted dividends fluctuate. You can observe that in period 1 dividends are Rs. 80 crores, in period 2 Rs. 110 crores and in period 3 Rs. 50 crores and so on.

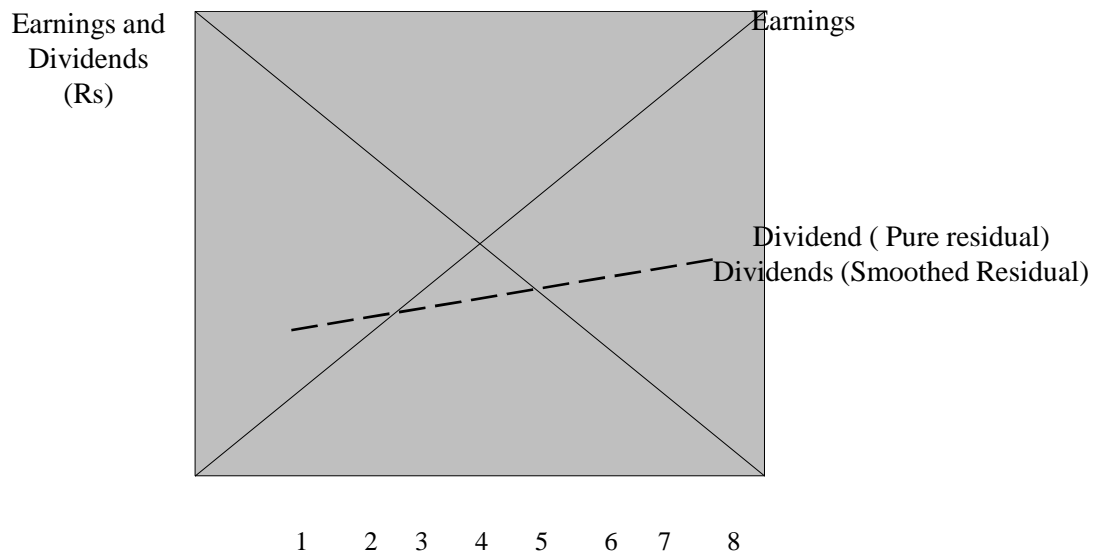


Fig. 11.4 Residual dividend policy

**ii) Smoothed Residual Dividend policy :** Smoothed residual dividend policy is more appropriate in which case dividends will show a steady progression. It is a combination of pure residual dividend policy and principle of steady change. Under this policy, dividends are gradually change over a period of time.

**Table 11.2 Smoothed Residual Dividend policy**

<i>Period</i>	1	2	3	4	5	6	7	Total
Earnings	150	190	140	220	280	250	290	1520
Capital budget	140	160	180	200	220	260	270	1430
Equity investment	70	80	90	100	110	130	135	715
Smoothed Residual Dividend	85	95	105	115	125	135	145	805

Table 11.2 gives the data on smoothed residual dividend policy of a firm. In this case the amount of dividend steadily rose from Rs. 85 crores to Rs 145 crores. This method is best suited in the world of uncertainty where earnings are erratic and shareholders expect steady dividends.

According to Lintner's survey of corporate dividend behaviour, most of the companies think in terms of the proportion of earnings that should be paidout as dividends rather in terms of the proportion of earnings that should be ploughed back and companies try to reach the target payout ratio gradually over a period of time, because shareholders prefer a steady progression in dividends.

Thus, the dividends decision is an important means by which information about the prospects of a company are conveyed. Dividend policy should also resolve uncertainty and improve shareholders confidence, so that the market price of share stabilises and grows steadily.

### 11.4 Forms of dividend

**i) Stock dividend (Bonus Shares) :** Most companies pay cash dividend, but some companies pay stock dividend in addition to cash dividend. This stock dividend is popularly known as bonus share issue. Here, the bonus shares are distributed proportionately to the original shares of the stock holders. Therefore, each shareholder can retain his original proportionate ownership of the company.

Let us understand this concept with a small example. Suppose a hypothetical company has the following share capital and reserves.

	Rs. (crores)
Paid up share capital (1 crore shares, @ Rs. 10/-)	10
Reserves and surpluses (retained earnings)	10
Total net worth of the firm	20

Suppose the company declares bonus shares at 1 :2 ratio. That means for every 2 shares held, one bonus share will be issued. That means for 1 crore equity shares existing, 50 lakhs bonus shares are issued by converting reserves into paid-up capital.

After bonus issue the firm's capital structure is as under	Rs. (crores)
Paid-up share capital (1.50 crores shares @ Rs. 10/-)	15
Reserve & surpluses	5
Total net worth of the firm	20

Issue of bonus shares does not affect the networth of the shareholders. Bonus issue represents recapitalisation of the owners' equity portion. It is just a transfer of reserves to paid-up capital. Shareholders future dividends may rise as the number of shares owned by them has increased, because of bonus issue. A shareholder who originally owned 100 shares, now he will be the owner of 150 shares after bonus issue.

**Stock Splits :** A method of either increasing or decreasing (by a reverse split) the number of shares of stock outstanding while lowering or raising the market price per share. If a company believes that its share is too high priced and that lowering the market price will enhance trading activity, one equity share is divided into two or more shares.

Before stock split	
Common stock 2,00,000 shares with a Rs 10 par value	Rs. 2,00,0000
After Stock split	
Common stock 4,00,000 shares with a Rs. 5 par value	Rs. 2,00,0000

Stock split has no effect on capital structure it only increases the number of shares and reduces stocks par value. The stock splits are made generally prior to new issue of stock in order to enhance the marketability of the stock and stimulate the market activity.

**Stock repurchase (Buy-Back) :** Companies repurchase their stock in order to change their capital structure or to increase the returns to the owners. Companies with very good liquid position which do not have attractive investment opportunities, buy-back their shares. A company can buy-back its stock from the existing shareholders on a proportionate basis through the tender offer, from open market [through (i) back building process or ii) stock exchange] and from odd-lot holders.

### 11.5 Summary

Dividend policy of a company is influenced by various factors: (a) external factors and (b) internal factors. While adopting to the changes in the external factors and by taking into consideration the internal factors a company evolves a dividend policy.

Stable rupee dividend, stable dividend payout ratio, residual dividend policies are some of the dividend policies which are adopted by companies.

### 11.6. Key words :

Stock Dividend	:	Issue of bonus shares to the existing shareholders free of cost
Stock Split	:	Dividing each equity share into two or more shares.
Reverse Split	:	Decreasing the number of equity shares by combining two or more shares into one.
Dividend Policy	:	Policy related to the splitting of earnings into dividends and retained earnings.
Earnings per Share	:	Earnings available to shareholders divided by number of shares outstanding
Dividend per Share	:	Dividends distributed to the shareholders divided by the number of shares outstanding.
Dividend payout Ratio	:	Percentage of earnings distributed by way of dividends.
Retention Ratio	:	Percentage of earnings retained by the company after paying the dividends

### 11.6. Self Assessment Questions

1. What are the factors which influence the dividend policy of a company? Explain.
2. What is a residual dividend policy? Discuss various forms of residual dividend policy.
3. What is stable dividend policy? Explain its merits and demerits.
4. Write short notes on :
  - a) Stock dividend
  - b) Stock split
  - c) Stock repurchase
5. Write short notes on :
  - a) Tax considerations of dividend policy.
  - b) How does the composition of the shareholders influence dividend policy?
  - c) What is the influence of recession on dividend policy?
  - d) Which types of businesses are more affected by recession?

## WORKING CAPITAL MANAGEMENT AN OVER VIEW

### OBJECTIVES

The objectives of the lesson are to :

- ☆ identify the need for working capital and evils of excess and dangers of inadequate working capital
- ☆ identify the determinants of working capital
- ☆ explain the working capital financing and its policies
- ☆ highlight the importance of optimal investment of current assets
- ☆ explain the liquidity Vs profitability and their Trade off
- ☆ illustrate the impact of working capital policies

### Structure :

- 12.1 Introduction
- 12.2 Concept of Working Capital
- 12.3 Operating Cycle and its significance
- 12.4 Evils of excess working capital
- 12.5 Dangers of inadequate working capital
- 12.6 Determinants of working Capital
- 12.7 Types of working Capital
- 12.8 Financing of working capital policies of Financing and their impact
- 12.9 Optimal size of current Assets
- 12.10 Liquidity Vs. Profitability
- 12.11 Summary
- 12.12 Key words
- 12.13 Self Assessment Questions
- 12.14 Further Readings



## 12.1 Introduction :

Both current assets and current liabilities constitute the components of working capital. Working capital management refers to the control of both current assets and current liabilities which is regarded as working capital management. It involves control of the components of current assets such as cash, inventories, accounts receivables, marketable securities and current liabilities such as short - term debt, creditors, bank loans, etc. Management and control of working capital has been treated as the vital function of financial management in modern business. It is highly flexible in nature and policies and to be framed depending upon the market conditions prevailing in the economy. If controlling of working capital components is improved or reduced by one percent, it will make so much difference and the firms making profits will turn out to be losing and firms incurring losses will become profitable.

## 12.2 Concepts of working capital

### (i) Gross working capital

It refers to the investment in current assets such as inventories, cash, accounts receivables, debtors, etc., which can be converted into cash in short notice focuses attention on management of current assets. Investment in current assets should be adequate, since inadequate investment causes solvency problems.

Thus, working capital is necessary to run a business firm and to meet day - to - day expenses. Without current assets, it is not imaginable to make sales and maximise profits. Cash is generated through sales which is possible with the investment in inputs such as raw materials, consumables, labor etc., hence working capital is necessary for acquiring inputs.

### (ii) Net working Capital :

It refers to the difference between current assets and current liabilities. Net working capital can be positive or negative. It is conventional to maintain sufficiently excess current assets. It is a conventional rule to maintain the level of current assets twice that of current liabilities. Net working capital may be negative working capital which means negative liquidity. Net working capital refers to the judicious mix of long term and short term loans for financing current assets. However a minimum amount of net working capital is permanent and therefore it is necessary to finance with long term capital. Weak liquidity position is a threat to the solvency of the company.

Both gross and net working capital are necessary for a firm. Any size of current assets can be maintained by raising short term debts. So, a prudential management will see long term funds go into working capital, so as to be stable. Hence, a firm if maintains high net working capital is said to be sound. It does not mean that net working capital is to be too high. Too high net working capital i.e., if the difference between current assets and current liabilities is too high, it sounds idle current assets. Idle current assets may be in the form of bad debts, unmoving inventories, etc. Hence, too high net working capital is not a sound indication.

## 12.3 Operating cycle and its significance

The cash will not earn cash by magic unless invested in inputs such as labor, raw materials, consumables, etc. Thus, with cash initially the firm has to acquire raw materials and other imports. Secondly, the raw materials will have to be processed to become finished product. Thirdly, the finished

goods cannot be immediately sold. Fourthly, the finished goods on credit shall collect cash after at a later date. Thus the cash invested in business will pass through various stages. This passage process is called operating cycle' which shows various phases of inputs before they are converted into cash. The time taken for the completion of the cycle duration **time is called operating cycle time**. It is also called working capital cycle time as shown in the diagram 12.1

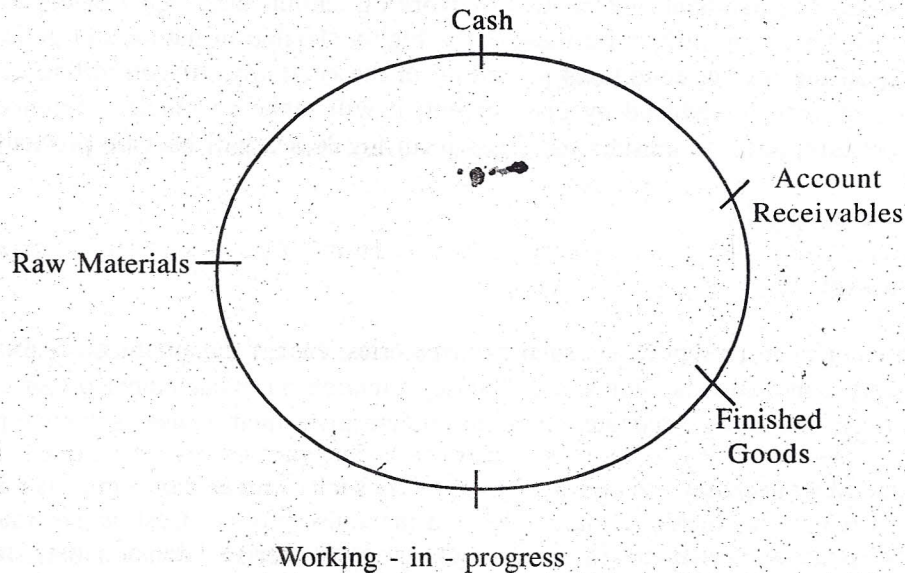


Diagram 12.1. working capital cycle / operating cycle

The operating cycle involves 4 stages. They are : Acquisition of inputs, Conversion of raw materials into finished goods, Conversion of goods into sales (Accounts receivables), and Collection of funds from the debtors.

Length of operating cycle period varies from industry to industry. Longer the period less the number of cycles in a year, the cash is more rotated. A firm which takes more time to complete a cycle implies that it will take more time to pay its bills and vice versa. Suppliers, financiers look into the operating cycle before lending cash or extend credit. In other words, firms taking less time will be quick in payments to its creditors. Thus, liquidity of a firm lies in the operating cycle and its length. If the length of the operating cycle increases, it means the firm requires huge amount of working capital. So, adequate amount of working capital is to be invested in current assets for smooth and uninterrupted production and sales activity of the business.

#### 12.4 Evils of excess working capital :

The size of working capital should be always optimum and should be neither low nor excess. But arriving of optimum level of current assets depends upon experience and expert knowledge. The excess working capital refers to the idle working capital or idle funds in business which causes losses to the firm.

The following are the consequences of the excess working capital in any organisation :

- i) excess cash yields no returns and results in miss use of funds and the interest what the firm incurs on excess cash is a direct loss;



- ii) excess inventories cause deterioration in quality, sometimes fall in prices followed by wastage and mishandling, and
- iii) excess debtors are likely turned out-to-bad debts.

Thus, firms do experience risks without optimum working capital and therefore, every firm should have optimum level of working capital only.

### 12.5 Dangers of inadequate working capital :

Investment in current assets may some times be inadequate i.e., less than what is required. This inadequate working capital causes various financial problems. They are :

- i) cash shortage causes cash - out and liquidity problems. Further firms losses business opportunities and at times forego discounts on bulk purchases.
- ii) lack of maintenance of adequate levels of raw material inhibit the production activities and thereby firms forego sales.
- iii) inability to maintain sufficient levels of finished goods for want of working capital limits sales opportunities and thereby, firm's profits will be poor as such firms will not grow further.
- iv) firms may feel great inconvenience to implement projects due to lake of sufficient working capital.
- v) firms do not pay bills and dues timely, thereby loses reputation and goodwill.

Thus, firms do undergo dangers without optimum working Capital. Hence it is neither desirable to imagine short of working capital nor excess working capital and therefore, a firm should have optimum size of working capital which minimises the cost of production and maximises the probits of the organisation.

### 12.6 Determinants of working capital :

It is understood that working capital is the vital component for future growth of the firm. Financial manager has to maintain adequate level of working capital. There are several factors influence the determinants of working capital. It is necessary to know those factors which identifying the optimum size of working capital.

#### i) Nature of business :

The size of working capital depends upon the nature of business such as trading or manufacturing. The manufacturing forms need relatively more working capital for maintaining current assets and firms do need more i.e., 60 to 70 per cent working capital than trading firms. Thus, working capital requirement depends upon the nature of the industry. en case of banking and financial institutions also need large amount of working capital to meet the needs of the custems where as public utilities such as railways, transportation, hotels, resorts need less working capital relatively

**ii) Capacity :**

The extent of working requirement of a firm also depends upon its plant capacity. Larger the capacity, higher the scale of operations and huge the goods and services are sold, hence the working capital required is heavy.

**iii) Market coverage :**

Working capital requirement largely depends upon the market size which names the extent of a market coverage decides the requirement of working capital. Larger the market, higher the requirement and vice - versa. Firms with state level market, national market and global market need working capital requirement.

**iv) Manufacturing cycle :**

Every product requires some technology to be used for converting the its inputs into finished product. Length of the process depends upon the type of technology used. Lengthy processes consume huge amount of working capital and vice - vera. For example, ship building industry requires more working capital as it takes more time to construct ships. Since, manufacturing process differs from product to product the size of the working capital also varies based on its manufacturing cycle.

**v) Advances :**

Infact some firms while booking order itself ask for advances by which they want to reduce the working capital pressures. Where as, the firms without such policy do need more working capital. Similarly, while making purchases also, the firms who have to give advances for supply of materials, consumables, services and laborers require more amount of working capital.

**vi) Technology :**

Technology refers to how-to and why-to in making a product or sesuce. This processing technology may be manual or mechanized or computerized. Higher the technology lesser the time taken to produce the goods or services. Hi - techs though required huge capital for acquring assets, but take, less time to finish the processing, thus require less working capital funds. Whereas, the production processes with manual methods require huge working capital as they use more number of workers and maintainance of work-in-process material.

**vii) Growth of the firm :**

Growing firms need more working capital as their sales tend to increases. The from time to time Sunrise industry do make more sales from year to year. Such firms need to plan for more working capital and it in order to arrange more inputs to meet the increasing demands.

**viii) Seasonal fluctuations :**

Generall, the demand for goods is of two kinds. One is seasonal and the other is permanent. The seasonal industries usvally produce goods only in the selected months, and in the off-season, they stop production. Industries such as sugar, tobacco, cotton, chilies etc., are such industries which need working



capital during season times only. These firms should arrange the working capital funds more in size during the seasons and produce the products even for meeting the customers demand during the non-seasonal period.

**ix) Production Policy :**

Some firms undertake production activity through-out the year, since they sell in several markets. Such firms require working capital all the twelve months in the year to supply their products in different months. Thus, these companies with continuous production require working capital continuously in the year.

**x) Credit policy :**

Firms sell goods always not for cash. offer some sales on credit to their customers for maximizing sales. The firms have to be flexible in their credit terms to enable sales. Such firms do require more amount of working capital than the firms which sell for cash always. Now a days credit has become common and necessary in the wake of competition. The firms selling on credit should review credit worthiness of their customers from time to time, so as to reduce the delay in collections. The collection department has to be alert and see that collections are made promptly. Therefore, the firms with efficient collection departments do require less working capital than the firms with liberal collection / credit policy.

**xi) Availability of supplies on credit lines :**

Firms buy goods, services and other inputs both for cash and credit. Normally, a firm is reluctant to commit cash and wish to get goods on credit. Hence, firms searching for supplies on credit require less amount of working capital than otherwise.

**xii) Operational efficiency :**

The operational efficiency firms will reduce their cost of production and provide more profit margin. Such firms can generate financial resources from within and they require less of working capital requirement.

**xiii) Experienced personal :**

The operational efficiency of the firm depends upon experienced personnel who take decisions effectively and implement them the efficiently. This caliber among employees enable the firm to function with minimum inputs thereby, reduces the pressure for more working capital requirements.

**xiv) Expansion chances :**

Firms having opportunities to expand or diversification will need more and more working capital. Whereas the firms which have reached saturation will not warrant more amount of working capital as their opportunities of expansion are sealed.

**12.7 Types of working capital :**

The working capital can be divided into Fixed and variable working capital. The diagram 12.2 shows the graphical presentation of these two types of working capital.

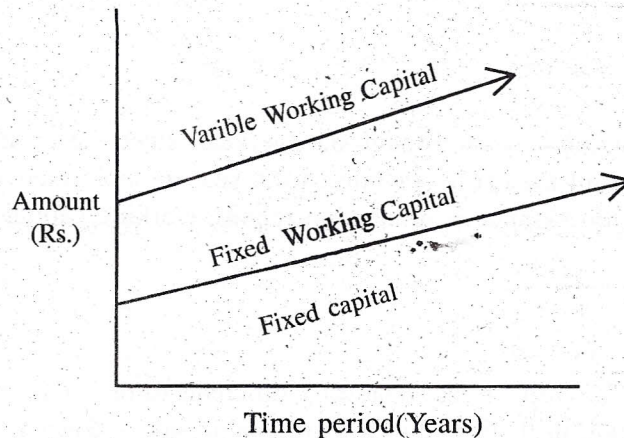


Diagram 12.2 Type of working capital

The size of fixed component in the total working capital rises from year to year in case of a growing enterprise. But it is not so in respect of variable component. It rises and falls depending upon the season, demand, competition, etc. however it increases over a period of time. Thus the line moves upwards in fluctuating manner. Whereas the fixed component of working capital steadily rises as years pass.

### 12.8 Financing and Polies of Working capital, and their impact

After arriving the estimation of working capital for any firm, the next step is how to finance the working capital requirement. It is of two sources of financing :

- i) short - term
- ii) long - term

Short - term financing refers to borrowing funds or raising credit for a maximum of 1 year period i.e., the debt is payable within a year at the most. Whereas, the Long - term financing refers to the borrowing of funds or raising credit for one year or more. The finance manager has to mix funds from these two sources optimally to ensure profitability and liquidity. The mixing of finances from long - term and short term should be such that the firm not face either short of funds or idle funds. Thus, the financing of working capital should not result in either idle or shortage of cash funds.

Policy is a guideline in taking decisions of business. In working capital financing, the manager has to take a decision of mixing the two components i.e., long term component of debt and short term component of debt. The policies for financing or working capital are divided into three categories. Firstly, conservative financing policy in which the manager depends more on long term funds. Secondly, aggressive financing policy in which the manager depends more on short term funds, and third, are is a



moderate policy which suggests that the manager depends moderately on both long term and short-term funds while financing. The working capital these policies are shown diagrammatically here under.

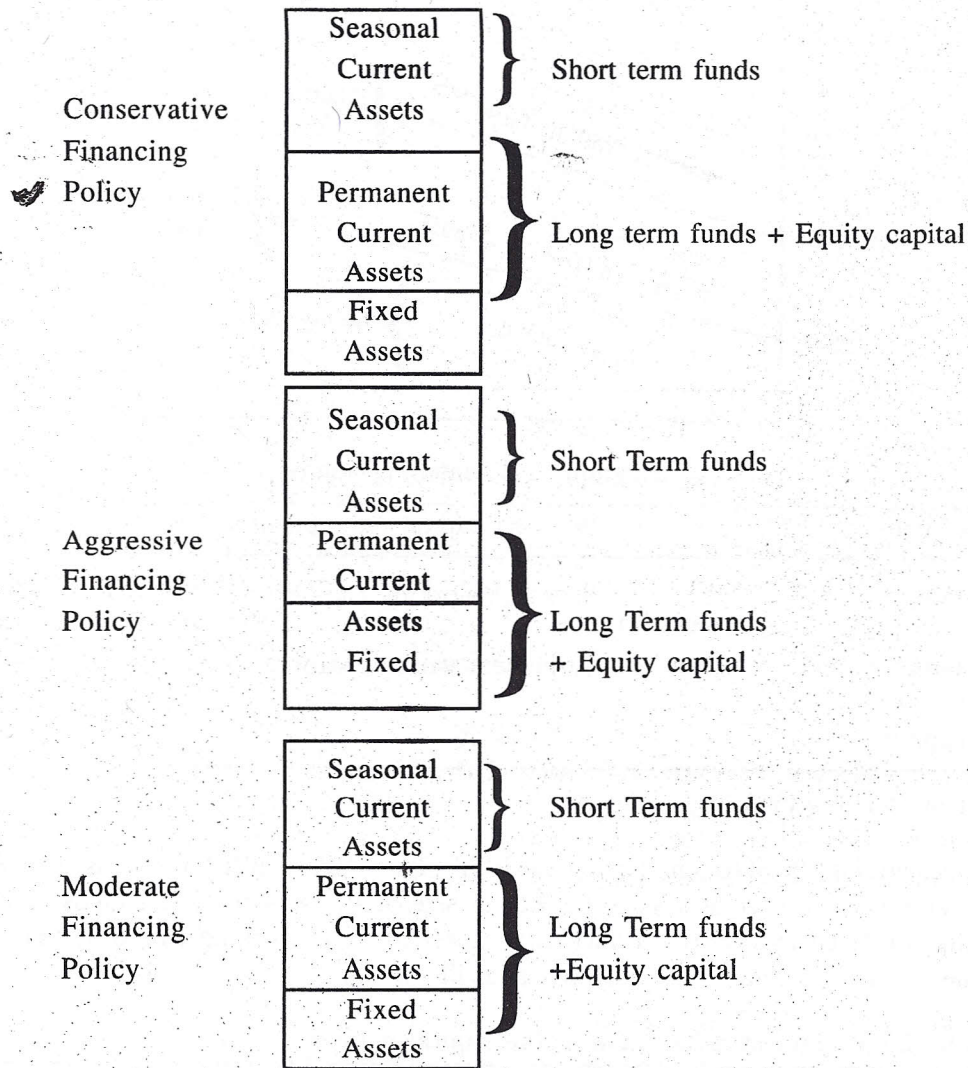


Diagram 12.4 ... Working capital policies

### 12.8.1. Matching Approach :

The question arising here is how to mix both short term and long term funds while financing required working capital. The guiding approach is known as 'matching approach'. It suggests that if the need is short term purpose, raise short - term loan or credit and if the need is for a long term, one should raise long term loan or credit. Thus, maturity period of the loan is to be matched with the purpose and for how long. This is called matching approach. Which matches the maturity period of the loan with the period for how long working capital requires. The following diagram 12.3 shows the graphic presentation of the matching approach.



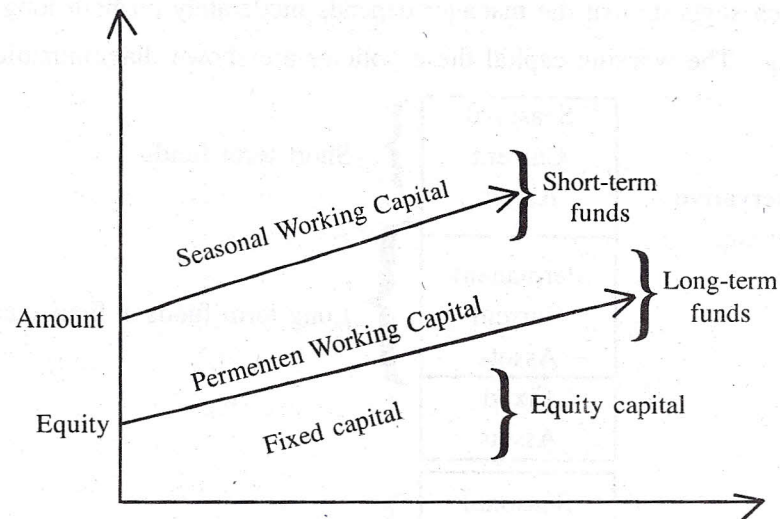


Diagram 12.3 Matching approach

Type of Funds		Working capital requirement
Short - term	-	Seasonal working capital
Long - term	-	Permanent working capital
Equity capital	-	Fixed assets

### 12.8.2. Impact of working capital policies :

A firm's sales are Rs. 25 lakhs, and having an EBIT - Rs. 3 lakhs. It has fixed assets of Rs. 8 lakhs. The firm is thinking to hold current assets of different size of Rs. 5 lakhs; Rs. 6 lakhs or Rs. 8 lakhs. Assuming profits and fixed assets do not vary, the impact of these working capital policies are in the following manner which is explained is a hypothetical illustration :

#### Illustration 12.1 Impact of different working capital polices

	Types of Policy (Rs. in lakhs)		
	Aggressive	Moderate	Conservatory
Sales	25	25	25
EBIT	3	3	3
Current Assets	5	6	8
Fixed Assets	8	8	8
Total Assets	13	14	16
Return on Assets%			
(EBIT / total assets)	23.07	21.42	18.75

Lower the level of current assets (aggressive) higher the returns (23.07 percent) higher the level of current assets (conservative) lower the returns (18.75 percent).

### 12.9 Optimal size of current Assets :

As we have discussed in the earlier paragraphs, current assets and their size depends upon several factors. Arriving appropriate size of current assets such as cash, raw materials, finished goods and debtors is a challenge to the financial manager of a firm. It happens some times excess or shortage. We have also discussed in the fore - gone paragraphs about the evils of excess working capital and inadequate working capital. Activity very few firms arrive optimum level of working capital by their sheer experience and scientific approach. The ratio of current assets to fixed assets helps in measuring the performance of working capital management. The higher the ratio, conservative the firm is in maintaining its current assets and lower the ratio, conservative the firm is in maintaining its current assets. Lower the ratio aggressive the firm is in maintaining its current assets. So every firm should balance their level of current assets and make it optimum.

### 12.10 Liquidity Vs. Profitability

Any exercise in working capital management will influence either liquidity or profitability. The working capital management is a razor edge exercise for financial manager of an enterprise. In this context the financial manager has to take several decisions of routine and non - routine such as :

sufficient cash balance to be maintained;

to raise longterm or shortterm loans decide the rate of interest and the time of repayment ;

decide the purchase policy to buy or not to buy materials ;

to determine the economic order quantity for inputs,

to fix the price at which to buy the puts if any ;

to sell for credit or not and terms of credit

to decide the terms of purchase ;

to decide the credit period and extent of credit

In all these aspects the financial manager has to take decisions carefully so that the firm's twin objectives such as profitability and solvency are not affected.

#### 12.10.1. Trade off between liquidity and profitability :

If a firm maintains huge amount of current assets its profitability will be affected though it protects liquidity. Here, it has to sacrifice the profitability. If a firm maintains low current assets, its liquidity is ofcourse weak but the firm's profitability will be high. The trade off between liquidity and illiquidity are shown in the diagram...12.5

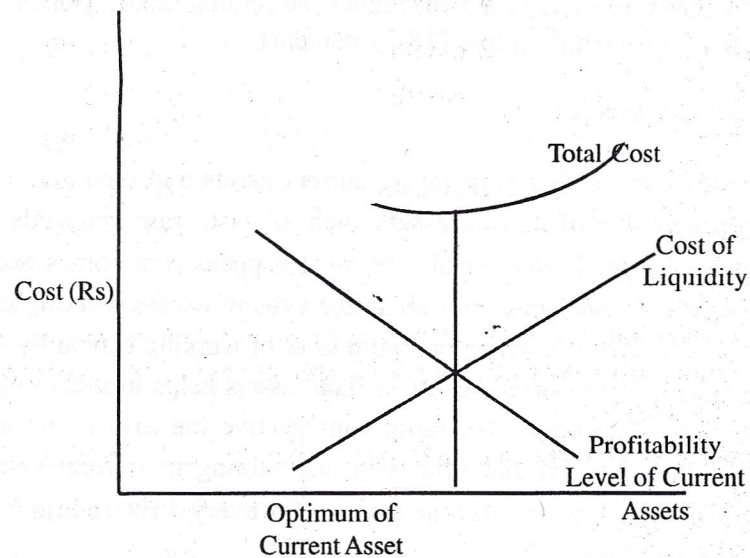


Diagram 12.5. A trade off between profitability and liquidity

### 12.13 Self assessment questions Exercises :

1. Explain the concept of working capital ?
2. Discuss the importance of working capital for a manufacturing firm ?
3. Explain the dangers of excess and shortage of working capital ?
5. Brief by out line the determinants of working capital of a firm ?
6. Compare and contrast the twin objectives of profitability and liquidity ?
7. How do you decide the optimum level of working capital ? Explain the cost of illiquidity ?
8. Discuss the merits of matching approach
9. What are the financing schemes available to working capital ?

1. XYZ company is about to commence new business and finance has been provided in respect of fixed assets. They have however asked you to advise the additional amount which they should make available for working capital.

They provide you with the following estimates for their first year and inform you that they have arranged an overdraft limit with their banker of Rs. 5,50,000.

Particulers.	Average period of credit	Estimate for the first year (Rs.)
Purchase of materials	16 weeks	56,00,000
Wages	2.5 weeks	29,50,000
Overheads	3 months	2,00,000
Directors & Managers salaries	2 months	5,60,000



Travelers and office salaries	4 weeks	6,55,000
Travelers commission	2 months	3,00,000
Other overheads	1 month	8,00,000
Sales : Cash	—	2,40,000
Credit	17 weeks	185,00,000
Average amount of stock work - in - progress		13,00,000

Sales are made at an even rate for the year. You are required to prepare from the above figures an information table for submission to your clients giving an estimate of the average amount of working capital which they should provide.

11. ABC Ltd., plans to sell 130,000 units next year. The expected cost of goods sold is as follows.

	Rs. (Per unit)
Raw materials	250
Manufacturing expenses	130
Selling, administration & finance expenses	50
Selling price	3000

The duration at various stages of the operating cycle is expected to be as follows :

Raw material stage	3 months
Work in process	2 months
Finished goods stage	1 month
Debtors stage	2 months

Assuming a monthly level of 12,500 units of production calculate the investment in various current assets.

#### 12.14 Futher Readings

Van Horne, James C.	:	Financial Management
Khan M.Y. and Jain P.K.	:	Financial Management
Prasanna Chandra	:	Financial Management
Bhalla	:	Financial Management

## CHAPTER - 13

# CASH MANAGEMENT

### OBJECTIVES :

After studying this lesson, you should be able to :

- ☆ understand the functions, situations and objectives of cash management
- ☆ explain the motives for holding cash
- ☆ know the factors affecting cash, benefits of adequate cash and cash budget preparation
- ☆ determine the optimum cash balances and cash planning
- ☆ develop the cash management strategies

### Structure :

- 13.1 Introduction
- 13.2 Functions of Cash management
- 13.3 Situations in cash management
- 13.4 Objectives of cash management
- 13.5 Importance of cash management
- 13.6 Motives of holding cash
- 13.7 Controlling of cash flows
- 13.8 Collection responsibility
- 13.9 Factors affecting cash
- 13.10 Management attitude towards cash management
- 13.11 Benefits of adequate cash maintenance
- 13.12 Cash budget
- 13.13 Determination of optimum cash balance
- 13.14 Cash planning
- 13.15 Cash management strategies
- 13.16 Summary
- 13.17 Key words
- 13.18 Self Assessment Questions / exercises
- 13.19 Further Readings

### 13.1 Introduction :

Now a days, all business transactions are done with cash in the form of coins and notes. Normally, every business firm holds 1 to 3percent of its assets in the form of cash to enable itself to discharge its routine and non-routine obligations such as payment of salaries, meeting bills, pay for expenses, repayment of loans, dividends, interest, etc. The comfort of business transactions depends more on the amount of cash it holds either in bank or on hand. To enable its liquidity and paying capacity, a sound cash management is necessary.

### 13.2 Functions of Cash management :

The following are the functions of a cash offer of any business concern irrespective of its size, nature, volume of business, age, etc. The same can also be said that management of receipts and payments.

- i) Forecasting cash needs ;
- ii) Expediting cash collections ;
- iii) Disbursing cash to meet firm's obligations and
- iv) Gainful investment of surplus cash;

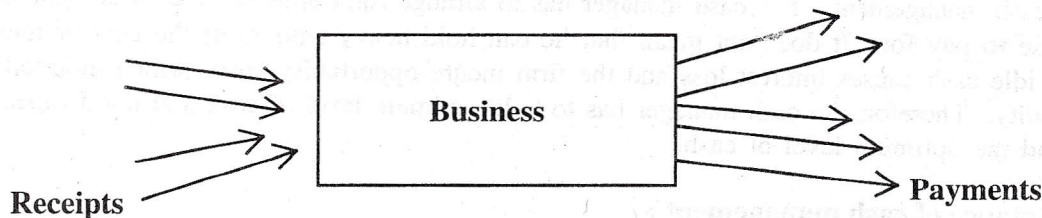


Diagram 13.1. Receipts and payments

### 13.3 Situations in cash management :

I Cash shortage

II Excess cash

Firms always experience either situation I or situation II unless its cash is properly managed. Cash receipts and payments of a firm very rarely coincide, thus coincidence of cash receipts and payments is a big challenge. Either a firm faces cash shortage or cash surplus if not cash officer controls its cash flows. Normally, in these days of heavy competition, due to the uncertainties of cash sales and cash collections disbursements tend to be more than the cash receipts. The function of cash management is to match these two either by borrowing during times of cash shortage or investing cash in times of surplus so as to ensure that the firm is free from cash problems. Thus, cash manager invests the excess cash in securities and see the that it will be made available in times of scarcity.



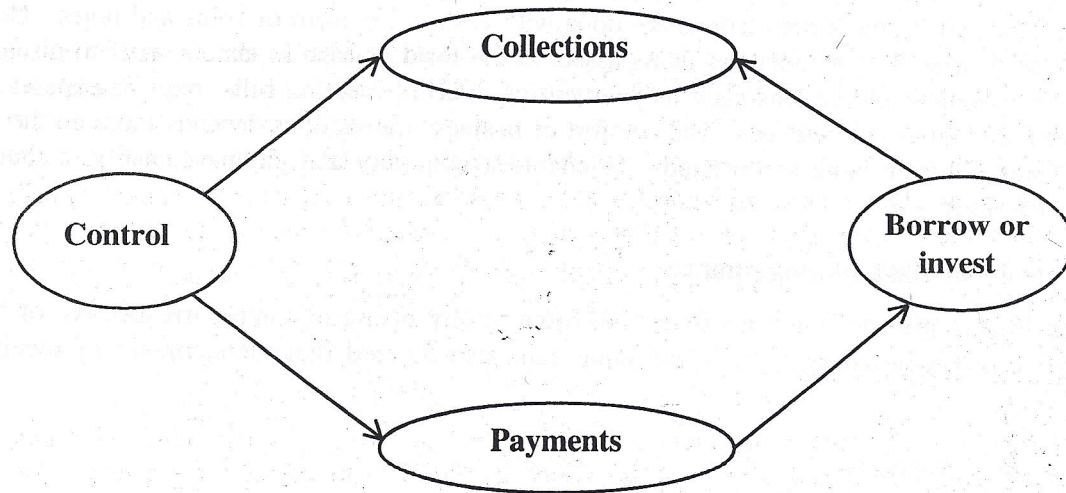


Diagram 13.2 Cash cycle

### 13.4 Objectives of cash management

The twin objectives of working capital management such as profitability and liquidity are also implied to cash management. The cash manager has to arrange right amount of cash at right time for a right purpose to pay for. It does not mean that he can hold heavy amount at the cost of interest. In simple, the idle cash causes interest loss and the firm incur opportunity cost, which indirectly affects the profitability. Therefore, the cash manager has to hold optimum level of cash and not a rupee extra or short beyond the optimum level of cash.

### 13.5 Importance of cash management :

Cash is unique resource and not comparable with any other component of current asset. If excess cash is held, it will not generate profits since cash is sterile. It will not be productive directly as in the case of other assets. Inventory bought excess will be useful even after sometime, without loss of value and many a time value of inventories tend to increase due to inflation. Hence idle cash will not generate profit but causes loss of interest. Further, cash shortage causes irreparable loss to the management, since firms loose not only profitable business opportunities but also goodwill when they fail to clear the bills timely due to cash shortage.

### 13.6 Motives of holding cash :

famous economist, Keynes said that the businessmen hold cash for 3 motives which are as follows:

- i) Transaction motive ;
- ii) Speculative motive ; and
- iii) Precautionary motive

#### 13.6.1 Transactions motive :

Cash manager is expected to arrange right amount of cash at right time to pay for a right purpose. Infact, the cash receipts will never synchronize with cash obligations to pay for. Hence to meet the expenses timely, a firm has to hold optimum amount of cash and keep the firm comfortable in its cash transactions. Larger the business transactions more the amount of cash balance to be maintained and vice - verse.

### 13.6.2 Precautionary motive :

Firms at times need cash without prior notice. They need cash under emergency conditions such as break down of machines, fire, theft, accidents etc failing which they have to pay heavy penalties. In such cases cash rich companies can withstand rather than nil less cash companies. Thus, casualties, accidents, theft, machinery break - down, etc., in organizations generally demand cash immediately. To meet the said eventualities, the firms have to maintain cash balances. This cash balance is called precautionary cash balance. Hence they have to raise funds in very short notice or some times spontaneously also. At that time only cash rich companies credit worthy will be able to survive under hectic conditions cited above.

### 13.6.3 Speculative motive :

Of course, not all firms do business with speculative motives. Occasionally, every business firm comes across speculative conditions such as sudden and heavy fluctuations in prices of raw materials and rates of interest leading to rise in market for goods. Hence, there is sudden rise in demand for goods, which warrants availability of cash in very short notice. Thus the speculative conditions give chance to raise profitable opportunities. Firms, having ability to generate cash in short notice will take advantage of these speculative conditions of business opportunities.

## 13.7 Controlling of cash flows :

The task of cash manager is to match the inflows and outflows of cash. For this, the manager starts with cash budget, where total cash receipts and payments of an enterprise are forecasted. In this broad exercise of cash management, synchronization of cash flows is the real task. The cash flows will never synchronize and it always the disbursements tend to be higher than receipts. Then the cash manager wisely accelerates the inflows and delays disbursements by all means without affecting liquidity and profitability the twin objectives of any business enterprise.

In practice collection of cash from debtors is time taking. The present system is so poor that cash manager can not expedite collections unless he plans and takes necessary steps to reduce the gap between the date - the customers pay bills by cheque and the date of funds made available for firm's use i.e., reaching time and processing time. The cheque in transit takes minimum 2/3 days to receive and again the check has to be collected through bank which takes minimum of ten days. Under the present state of postal and banking system the minimum days that comes around 15 days. Hence, in order to reduce the time period the cash manager has to speed up mailing, cheque processing and collection times.

### 13.7.1 Decentralized collections :

To save mailing and processing time, can firms have decentralized collection practices. For this the firms have to open several bank accounts and use them as collecting centers operated throughout the country. These centers collect the money and deposit in banks on the same day which can be credit to central office account by using electronic media.

### 13.7.2 Lock box system :

Under the lock box system, lock boxes are arranged in banks which are collection centers. The customers are supposed to drop cheques into these boxes and the bank picks-up these cheques and



deposits them into the firm's bank account and send the information daily to the firm. with this process, the firm can save lot of transaction time and also save the cost for their processing. Finally, it results to reduce the transit amount of cash and therefore with less cash balances one is able to maintain the business.

**13.7.3 Cash discounts :**

The customers are informed at the time of invoicing that they will be paid cash discounts on invoice 1or 2 per unit if they pay before the maturity date of the bill. This way receipts can be expedited. Which is more benefited in the event of growing opportunities of the business of at the time of shortage of funds in the business.

**13.8 Collection responsibility :**

The sales personnel are made responsible to collect the bills, so that they do not recommend the credit for doubtful parties. This would also minimise the delay in receipts if the parties are sound and sales personnel pursues the bills pending.

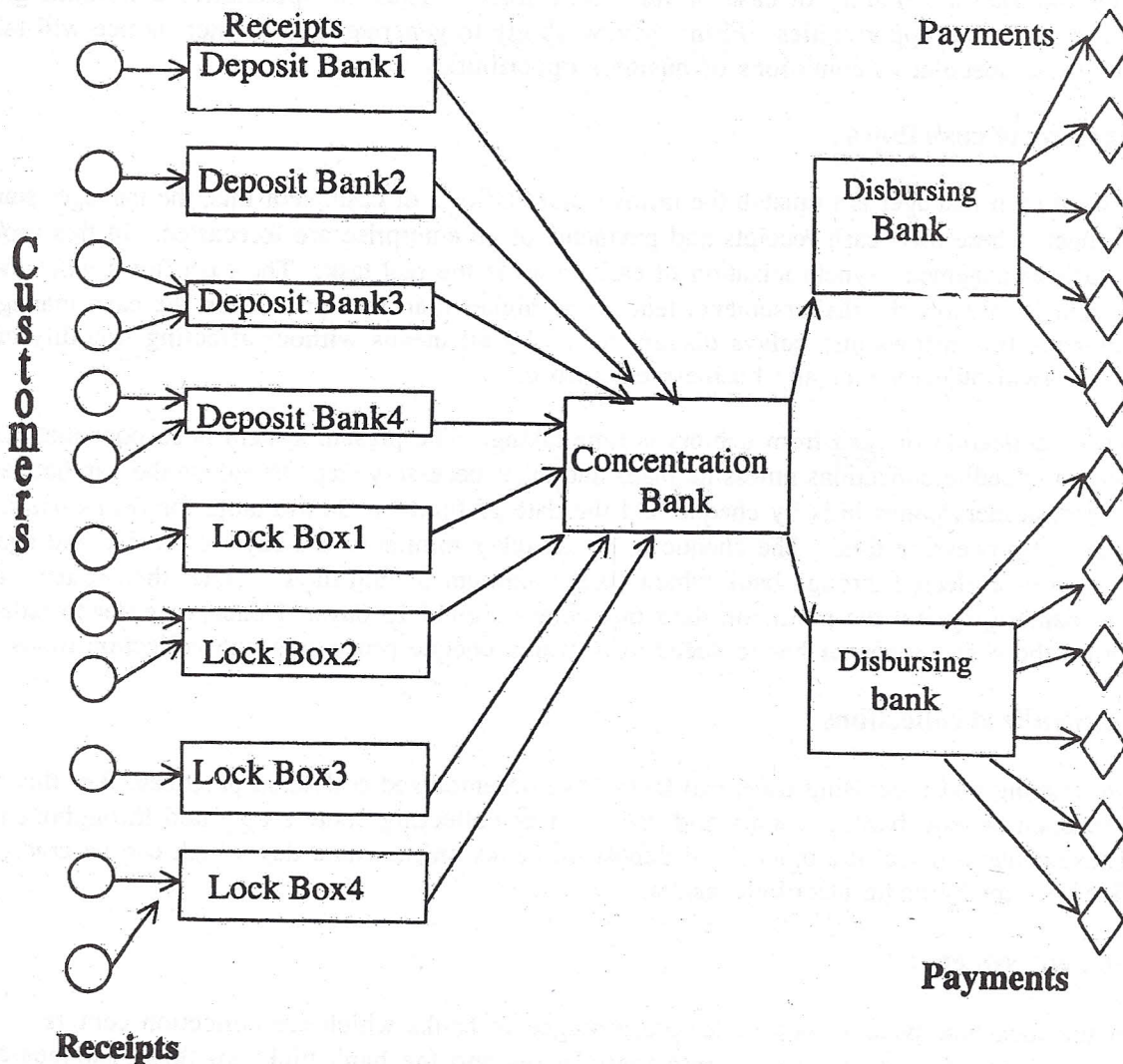


Exhibit 13.1. Cash Management System

### 13.9 Factors affecting cash :

The amount of cash requirement of a business firm depends upon the following factors which are discussed as under :

#### i) Credit position

Firms having goodwill in the market do not require cash balance much. They get services and goods on credit as they re-pay the bills timely out of the in sale proceeds and have such firms need not maintain heavy cash balances.

#### ii) Debtors position :

The ability to pay bills depends upon the company's sales policy i.e., whether on credit or cash, if credit for how long. Longer the credit period more the cash balances it should prepare to make its purchases. Further, a firm extending liberal credit will have its debtors position high and consequent of it more bad debts also. And firms with tight credit policy will maintain low debtors position and less bad debts hence and the firm is able to do the business with less cash balances.

#### iii) Nature of market :

It has great influence on cash requirement, in certain markets one has to buy on cash, since credit facility is not available. In some of the unorganised sectors and small businesses where bank loans are not extended, the firms have to arrange their own cash.

#### iv) Inventory levels :

Higher the inventory levels a firm follows, more the 'cash' required. Lower the inventory level, less lower the cash balances to be needed. Thus, inventory level certainly influences the cash requirements of the business.

#### v) Technology :

The firms which are followed manual methods need more cash by week ends to pay for wages. Whereas the firms whose business activities are more technology based require less amount of cash for the above said purposes .

#### vi) Efficiently in using cash :

Cash balance depends upon the efficiency in using cash. Professional managements maintain optimum cash balance and discharge cash obligations.

### 13.10 Management attitude towards cash Management :

Management attitude too will influence the cash requirements of business. Conservative managements do hold huge cash balance and, clear the bills without reminders, whereas aggressive management which maintain small cash balances in order to gain more and clears the bills after several reminders.



**i) Cash budget practices :**

Firms with cash planning and budgeting can avoid sudden and unsaid obligations and run firms smoothly without cash out problems.

**ii) Protection against loss :**

Companies have to take necessary measures to prevent theft or burglary by going for insurance. These protection measures will keep the firm comfortable, of course firms incur extra expenditure towards insurance premium.

**iii) Short costs or cash out problems :**

Firms if they do not maintain cash balance, have to face cash out problems thereby incur extra expenses or lose profitable opportunities. These costs are called short out costs and the firms, who are unable to get cash will be ready to incur such costs. So, management has to trade-off between short term losses and benefits of adequate cash balances.

**iv) Speculation factor and uncertainties :**

Firms in speculation business should have excess cash than others. Hence, one should take into account whether the business is involved in such business and should hold more cash in order to continue without sales and timely market for its production.

**v) Cooperation from bankers :**

Firms which pay their loans timely will be in good terms with banks. Such firms can go 'easy' in times of cash shortage, since bankers will extend cooperation and provide extra credit in times of need and when market conditions are bright.

**13.11 Benefits of adequate cash maintenance :**

The following are the benefits to a business firm who maintains adequate cash :

**i) Cash discount**

Firms can enjoy cash discounts and get goods / services at considerable prices if they made down payments. This will increase profits and credibility. Occasionally, creditors may also extend cash discounts for people who pay in - advance or with - in stipulated period.

**ii) Large scale buying**

If firms buy raw materials in large quantities they can get at low prices. Which will increase the overall profitability of the firms. The firms with cash balances are able to order bulk purchases to get them at lower prices.

**iii) Meet contingencies boldly**

Firm with adequate cash balance can absorb comfortably the unexpected changes in the market, technological and demand of the product.

**iv) Liquidity**

Firms, regular in payments of bills and taxes will be respected by the suppliers and cooperate by way of supplying required quantity of goods at lower prices. The suppliers can also ensure supply of goods in times of scarcity.

**v) Profitability**

Firms which bargain at the turn of purchasing inputs and services will get production at low cost. This will enhance profit margin of the firms which in turn will enhance its profitability.

**vi) Business opportunities**

Profitable opportunities can be had only if the firms maintain adequate cash. Otherwise, they lose new and bright business chances. New business opportunities will come to firms with abundant cash. Firms often face cash - out problems do not ensure growth and cannot undertake new ventures.

**vii) Easily overcome contingencies**

Firms some times involve in accidents such as fire, theft, break down, change of technology, need for modernization etc. The cash - rich companies can overcome such eventualities easily.

**viii) Better Bargain**

Firm with adequate cash can bargain and obtain inputs at reasonably low price and reduce cost of production.

**13.12 Cash budget :**

Cash budget is the summary statement of the firms expected cash inflows and out flows over a projected time period. It is a fool to forecast the cash inflows and outflows for a specific period. Cash forecasting is the focal aspect of cash budget. The expected cash receipts and payments are portrayed to arrive cash balance or cash shortage. The cash budgets can be prepared for weekly, monthly, quarterly and yearly. It is a short term cash forecasting method. To work various policies of working capital 'cash budget' will help particularly for making the following policies.

- i) purchase,
- ii) credit
- iii) cash and
- iv) inventory,

**i) Components of cash Budget :**

Sales

Collection of Sundry debtors

Receipts of interest and dividend

Expenses and advances

Wages and Salaries

Purchase and sale of assets



Loans / credit

Deposits

While preparing cash budget information relating to the above is necessarily collected. Cash manager has to keep the following plans ready while preparing the cash budget.

- Production plans,
- Purchase plans,
- Financial plans, etc.

**ii) Methods of preparing cash budget :**

There are various methods of cash budget preparation, of which the :

**Receipts and payment method is of the methods for preparation of the cash budget.**

It summarises the receipts and payments for a specific period.

**Exhibit : 13.2 Proforma Cash Budget on a hypothetical basis :**

	Jan	Fed	March	April
<u>a) Opening cash balance</u>				
<u>b) Receipts</u>				
Cash Sales				
Collection of Debtors...				
Rent				
Dividends				
Receipts from sale of machinery				
Interest on securities				
Total receipts				
<u>c) Payments</u>				
Cash purchases				
Creditors paid				
Wages / Salaries				
expenses				
Dividends				
Taxes				
Purchase of asscts				
Rent				
Total payments				
d) <u>Net cash flow (b-c)</u>				
e) <u>Closing balance (a+d)</u>				
f) <u>Minimum cash balance</u>				
g) <u>Surplus / short (a-b)</u>				

**iii) Variance in cash budget method :**

Future scenario may be normal, optimistic and pessimistic. Taking these situations into consideration variable cash budgets are prepared. These variable cash budgets suggest levels of cash balances depending upon future trends.

**13.13 Determination of optimum cash balance :**

Cash balance can not be too high or low. The lower cash balance than the required level of create problems. The higher level of cash balance, will ensure liquidity, but the firm has to sacrifice profits as excess cash will not yield returns. Higher the holding of cash more the carrying costs lower the level of cash balance more the transaction costs. Thus, cash manager of a firm has to trade off between higher and lower levels of cash balance and reach out optimum level of cash. The following diagram 13.3 shows graphically the optimum level of cash.

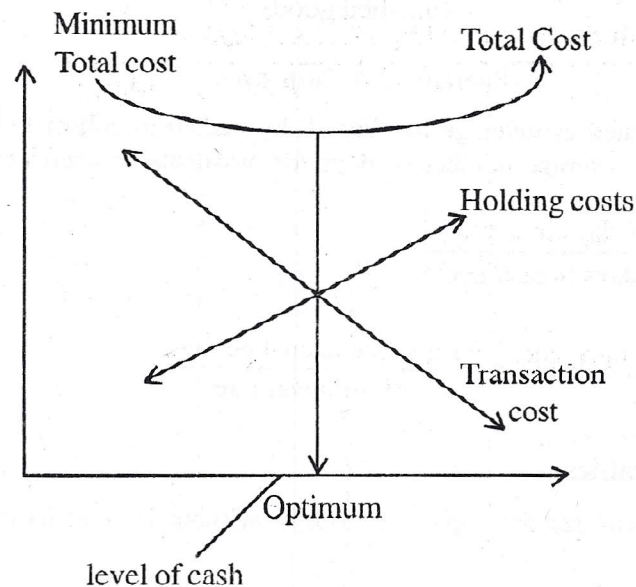


Diagram 13.3 Optimum level cash

**13.14 Cash planning :**

Cash planing refers to looking into future cash needs of a firm and it is a practice which should be carried out periodically. Firms practicing cash planning will not have cash problems. Thus, cash planning is as good as insuring a firm from shocks of cash shortage caused by market uncertainties. Hence, the cash planning is a tool to control the use of cash optimally.

**13.15 Cash managements strategies :**

Cash cycle refers to the number of times taken to collect cash from the aebtors form the day of investment in raw materials.

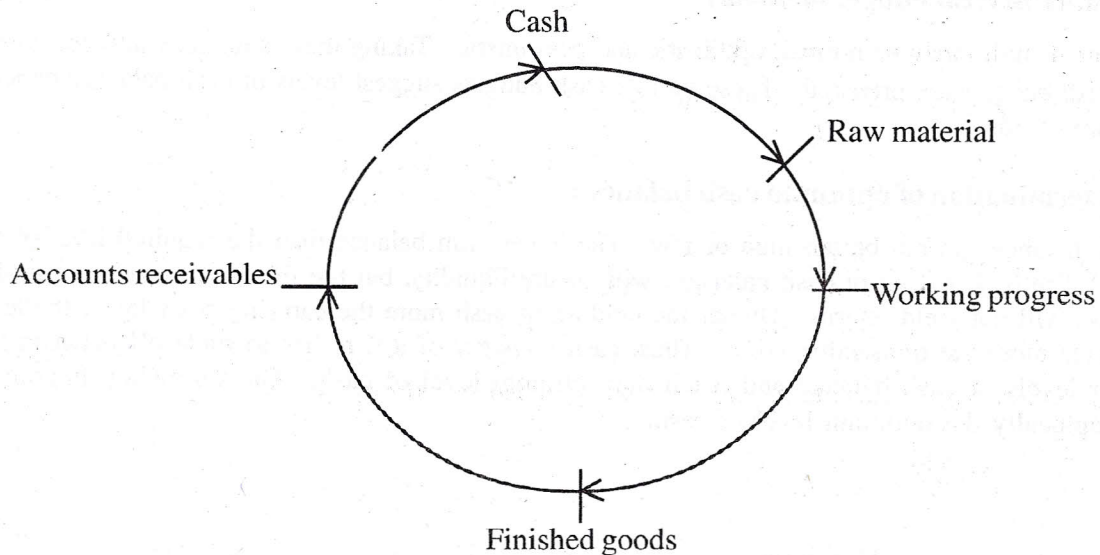


Diagram 13.4 Cash cycle

Cash cycle can be calculated as (average number of days taken to collect from accounts receivables + average age of inventories - average number of days for payments of accounts payable.)

$$\text{Cash turnover} = \frac{\text{No. of days in a year}}{\text{No. of days in cash cycle}}$$

$$\text{Minimum operating cash balance} = \frac{\text{Firms total annual outlays}}{\text{Cash turnover rate}}$$

### i) Stretching accounts payables

The management of a firm can delay paying the bills without losing its credibility. Thus, it can postpone the cash pressures.

### ii) Efficient production

Using efficient production techniques, technology and scheduling the inventories can be transformed speedily into finished goods. Here, the management can also use better techniques of inventory so that the taken time to hold inventories will be reduced.

### iii) Efficient collection

Using all possible techniques, the firms can collect cash from accounts receivable as quickly as possible so that cash cycle will be better.

### Illustration :

From the following information what would be the saving on cost ? Assume 10% is earnings of the investment, what would be the effect of stretching accounts payable on the minimum operating cash requirement ?

Cash turnover = 10 time

Annual cash outflow = Rs 3,00,000

Accounts payable can be stretched by 30 days.

**Solution :**

$$\begin{aligned} \text{Cash turnover} &= \frac{\text{No. of days in a year}}{\text{No. of days in cash cycle}} = \frac{360}{10} \\ &= 36 \text{ days (present)} \end{aligned}$$

Cash cycle, when accounts payable can be stretched by 30 days would be :

$$= \frac{360}{6} = 60 \text{ days}$$

$$\text{The minimum operating balance} = \frac{3,00,000}{10} = \text{Rs } 30,000$$

$$\text{The proposed operating cash balance} = \frac{3,00,000}{60} = \text{Rs. } 5,000$$

$$\text{The reduction in cash balance} = \text{Rs. } 30,000 - \text{Rs. } 5,000 = \text{Rs. } 25,000$$

Saving by investment of cash released (25,000 x 10%) = Rs. 2,500/-

**13.16. Self Assessment Questions / Exercises :**

1. Explain different principal motives of holding cash.
2. What are the benefits of cash management ?
3. Explain Lock - Box system.
4. What is meant by concentration banking.
5. Explain utility of cash budget.
6. What are sources and uses of cash ?
7. Explain the methods of cash budgeting.
8. Explain techniques used in accelerating cash collections.
9. Distinguish between a deposit float and payment float.
10. How does appropriate cash balance be determined ?

Prepare a monthly cash budget for six months beginning from April 2003 on the basis of the following information.



i) Estimated monthly sales are :

	Rs.
January	22,000
February	340,000
March	320,000
April	200,000
May	180,000
June	1100,000
July	12,20,000
August	10,00,000
September	70,000
October	2,20,000

ii) Wages and salaries are estimated as :

April	20,000
May	20,000
June	32,000
July	35,000
August	33,000
September	33,000

iii) Cash sales are 40% of sales and the credit sales are collected in two months.

iv) Purchases amount 60% of sales and are made and paid for in the month preceding the sales.

v) The firm has to pay Rs. 100,000 as interest on debentures during June.

vi) The firm had committed to purchase fixed assets during August for Rs. 500,000. The firm has Rs. 1,38,000 cash balance as on 1.4.2003.

### 13.17. Futher Readings :

1. James C. Van Horne : Financial Management
2. Khan and Jain : Financial Management
3. Pandey I.M : Financial Management

**LESSON - 14****MANAGEMENT OF INVENTORY****Objectives :**

After studying this lesson, you should be able to :

- \* understand the nature of holding and objectives of inventory.
- \* identify the needs for holding inventory.
- \* reveal the undesirable consequence of excess stocks.
- \* know the function and characteristics of inventory.
- \* explain the cost, techniques and strategies of inventory management.
- \* list out the measures to check the inventory management effectiveness.

**Structure**

- 14.1. Introduction**
- 14.2. Motives of holding inventories**
- 14.3. Need for holding inventories**
- 14.4. Undesirable consequence of excess stocks**
- 14.5. Characteristics of inventory**
- 14.6. Inventory costs**
- 14.7. Objective of inventory management**
- 14.8. Inventory management Techniques and strategies**
- 14.9. Measures to assess the inventory management**
- 14.10. Summary**
- 14.11. Key words**
- 14.12. Self assessment Questions / excersises**
- 14.13. Further Readings**



### 14.1. Introduction

Inventory management is the crucial aspect of the whole working capital management, since inventories constitute 60 to 70 percent of current assets in any manufacturing company. Success of any industry depends upon inventory policies. The inventory controller is expected to ensure right inventory at right time, right quality from a right place at right price in order to minimise the cost of manufacturing. The first enemy to management of firm is inventory. Inventory started from suppliers, passes through various stages and finally reaches the consumer. Inventories are 3 types:

- \* Raw material,
- \* Working progress, and
- \* Finished goods

### 14.2 Motives of holding Inventories

In a country like India inventories (stocks) are necessarily to be held without which production can not be imagined. The motives for holding inventories are 3 types such as transaction precautionary and speculation motive.

#### i) Transaction motive :

To ensure continuous business transactions raw materials are held. Without adequate inventories it is hardly possible to imagine continuity of production. If enough raw materials are not held, production activities cannot be carried out regularly. If for any reason production is stopped for want of raw materials the salaries to staff, depreciation, rent, etc., will cause severe loss to the firm.

#### ii) Precautionary motive :

Some times accidents, machine break down, lay off, strike, etc occur without prior notice under which situation, production should not suffer. Hence, inventories are necessarily to be carried out for smooth going of production and sales even in adverse times.

#### iii) Speculation motive :

Changes in technology, market conditions, cause sudden rise or fall in prices of supplies. To cope with the changing conditions, businessman carries inventories. Price fluctuations affect demand and supply aspects of goods which will in turn affect production and sales activities. To avoid such odd situations inventory holding is appropriate.

### 14.3. Need for holding inventories

#### i) Continuous production :

Production without halt will be possible by holding enough inventories. Otherwise, firm has to incur heavy costs for keeping the machine idle.

#### ii) Continuous supply market :

Proper inventory management will ensure finished goods without interruption and customer satisfaction could be possible.

#### iii) No stock - out problem :

Shortage of inventories often cause stock - out problem, thereby consumers shift to competitors.

#### iv) Cost saving :

Enough inventories will ensure continuous production, in the absence of which cost of production will be high.

#### v) High margin of profit :

Cost saving would enable the problems to enjoy better profit margin and ultimately higher returns to the firm.

#### vi) Advantages of price vise :

Prices fluctuate due to changes in supply and demand factors when prices rise, the firms holding inventories will enjoy sudden profits.

#### vii) Scarcity :

At times raw materials, may become scarce due to sudden changes in supply or power failures. In these situations inventories holding would enable the firms.

### 14.4. Undesirable consequence of excess stocks

- \* Unnecessary tie up of funds,
- \* Interest burden,
- \* Low profitability,
- \* Deterioration in quality of goods,
- \* Theft and obsolescence,
- \* Excessive carrying costs,

## 14.8 Characteristics of inventory

- i) **Stock out problem** : If adequate stocks are not maintained, the firm face stock out problem. i.e., risks for not maintaining adequate stocks. If raw materials are not adequate, production schedules suffer and interrupted production will not ensure regular supply of goods whereby firm loses its market. If production activities are stopped due to irregular supply of raw materials and other inputs, cost of production will be high since fixed costs per unit will be more.
- ii) **Lead time** : It is the time taken from the initiation of order till the arrival of goods. Lead time may vary from one day to many days. It depends upon the availability of item, distance, transportation, etc. The time gap can be reduced through proper inventory planning.
- iii) **Quantity discounts** : If goods are produced on large scale producers will enjoy economies of scale. These economies or savings occur where fixed costs are distributed over large production, ultimately cost of production per unit will be lower. Sometimes production will extend to customers by giving quantity discounts. This is a peculiar characteristic associated with inputs mainly raw materials and other consumables.

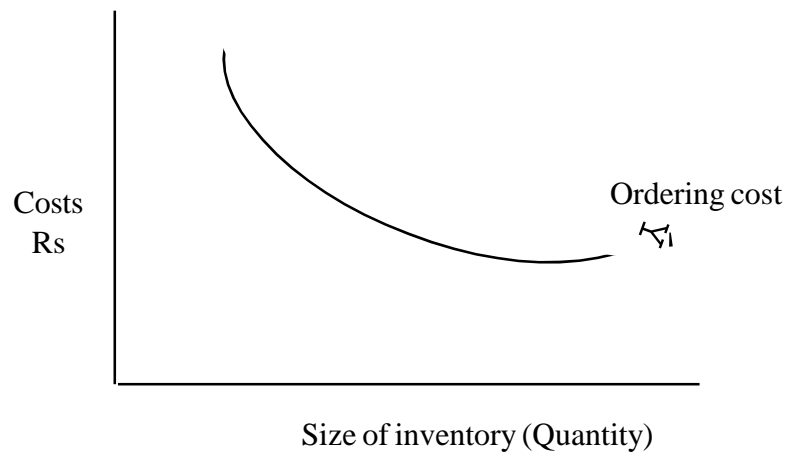
## 14.9 Inventory costs

There are various kinds of costs in inventory management.

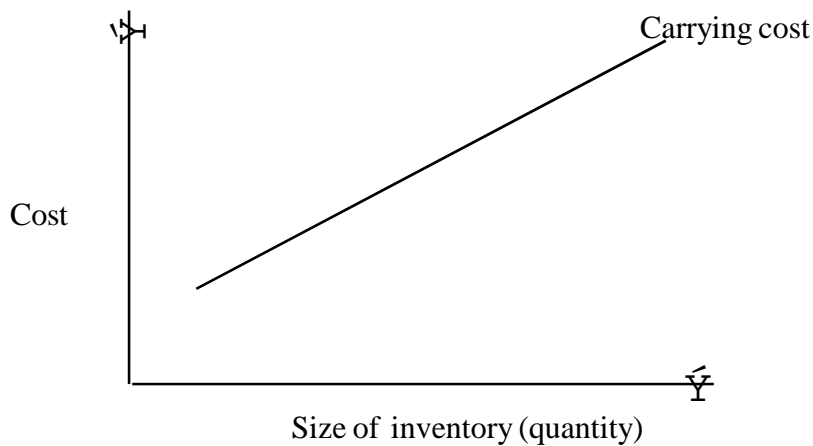
- i) Ordering costs
- ii) Carrying costs
- iii) Other costs

**i) Ordering costs** : Costs incurred in placing order with suppliers of raw materials, consumables and other inputs are called ordering costs. These costs include stationary, requisitioning, mailing expenses, telephone bills, correspondence charges, typing, salaries, dispatching, inspection, checking, travel, follow up costs, etc. Larger the order size lower the cost per unit. Thus, ordering costs can be minimised by placing order for bigger quantity.

**ii) Carrying costs** : Warehousing, insurance, wastage, loss due to theft, deterioration, obsolescence etc., are called inventory carrying costs. These cost are more as the level of stock is higher. These costs are also known as holding costs. The following diagrams 14.1 & 14.2 show the graphic presentation of these costs.



**Diagram 14.1. Ordering cost**



**Diagram 14.2 Carrying cost**

**iii) Other Costs :**

**a) Lost sales cost :** Normally, whenever customers place order, the suppliers should be ready to dispatch the items. At times, the items when not readily available, the suppliers make the customers to wait. But customers (with out waiting) will go to competitors for the supplies immediately. Thus, the regular suppliers loses the profit which he would have got. This is known as opportunity cost or lost sales cost.

**b) Storage costs :**

Costs pertaining to warehousing of goods or inventory is generally called as storage costs. Example : rent, lighting, interest, insurance, checking, etc.

**c) Obsolescence cost :**

When goods are stored more quantity than demand for it, the quality deteriorates and models will become outdated. At times, they have to be sold at heavy discounts since the quality of goods is poor and design or model is outdated. This loss is called as obsolescence costs.

**d) Set up costs :**

Normally production is made regularly an item for few days / weeks. Whenever, order is placed for different items, the producer changes the regular processing and shift to new process to make it suitable to new order placed. Thus, when processing is shifted, the firm incurs costs of design, loss of clerical time consumption of, components and spares, etc. All these constitute set up costs.

**14.11. Objectives of inventory management**

The objectives of the inventory management is to ensure maximum and uninterrupted production with minimum investment in inventory. Thus, the efficient inventory management results the following advantages :

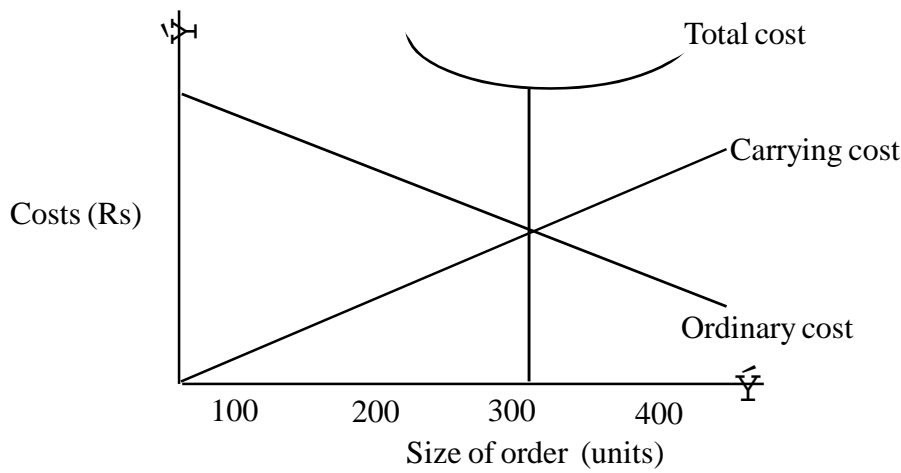
- i) ensure continuous production;
- ii) anticipate price changes and take advantage of price rise / fall by holding more or by reducing levels of inventories respectively.
- iii) control investment and keep inventory at optimum level;
- iv) maintain sales operations and delivery commitments.

**14.12. Inventory management Techniques and strategies :**

The essence of inventory management is to maximise profits with minimum investment in inventory for with various techniques are used to achieve this objective. They are :

- i) Economic order quantity
- ii) A . B . C Analysis
- iii) Ageing schedule
- iv) Safety stock
- v) Reorder point
- vi) Just . in . time approach
- vii) V . E . D analysis
- viii) F . S . N analysis

i) **Economic order quantity (EOQ)** : For efficiency, in inventory management the oft-encountered question, is for how much quantity one has to 'order for'. But it varies from item to item. The optimum quantity which is economically viable is called "economic order quantity" or "economic lot size". An order size should neither be high nor low. Higher the order size, an enterprise practices, more the carrying costs the firm incurs. Smaller the order size more the ordering costs the company incurs, since the firm places order many times a year. Here, management has to trade off between big and small size and reaches optimum size, where the total cost per unit is minimum. This is clearly shown in the following diagram. 14.3.



**Diagram 14.3 Economic order size**

**Illustration :**

From the following information, find out the economic order quantity

- a) annual consumption = 1000 units
- b) carrying cost = Rs.2/-
- c) ordering cost = Rs.50/-

**Solution :**

Order size (Q)	1000	500	250	100	50
Average inventory (Q/2)	500	250	125	50	25
Number of orders (A/Q)	1	2	4	10	20
Carrying cost $C \times (Q/2)$	1000	500	250	100	50
Ordering costs $O \times (A/Q)$	1050	100	200	500	1000
Total costs (Rs)	2050	600	450	600	1050



From this we can conclude that 250 units is the ideal order size. Hence, at this economic order quantity the firm is able to maintain the inventory with minimum cost of inventory management.

Using formula also we can identify the EOQ.

Formula :

$$EOQ = \sqrt{\frac{2AOc}{C_s}}$$

Where,

EOQ - economic order quantity

A - Annual consumption

Oc - Ordering cost per order

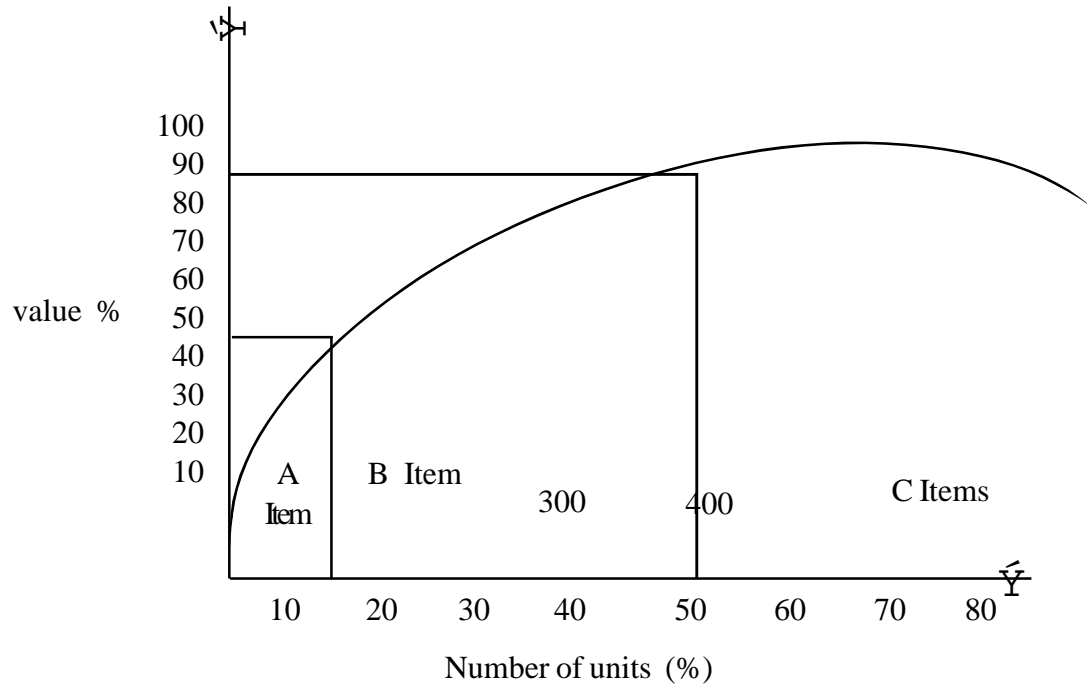
Cs - Carrying cost per unit year

$$EOQ = \sqrt{\frac{2 \times 1000 \times 50}{2}} = 250 \text{ (approx)}$$

**ii) A . B . C Analysis :** Inventory includes several items and they are categorised on the basis of value. All items need not be stocked in equal quantities. Every item may not be an essential one. So the financial manager divides all these inventories into 3 categories on the basis of value as under.

- a) high - value (A)
- b) moderate - value (B)
- c) low - value (C)

More over, all these items may not be consumed everyday. Since A items are very costly, tight control is used B items are under reasonable control and C items are under simple no control, since they are of low value. The graphic representation shows that items A, which is only 16 per cent in the total units of all the items, represents 60 per cent in terms of value. Whereas C items though represent 50 per cent in the total number are of only 20 per cent in terms of value and B items occupied middle place. Thus, A items are under tight control while planning, ordering, checking storing, dispatching, etc. Since, any negligence on the part of management would cause heavy loss because items are of high values.



**Diagram 14.4. A. B. C. analysis**

**Table 1. ABC Analysis**

Item	Units	% of total Phantity	Number Cumulative percentage	Unit Price	Total value	% of total value	Cumulative percentage of value	
1	1000	10	15	10	10000	19.15	67.06	
2	500	5		35	50	25000		47.89
3	1600	16	4		3	4800		9.19
4	1900	19			1.20	7600		14.55
5	3000	30	50	0.50	3600	6.89		
6	1000	10		0.70	500	0.95		9.18
7	1000	10		700	1.34			
Total	10000		100		52200		100.00	

iii) **Ageing schedule :** The inventory items are grouped-into basing on the number of days / months they have been lying in warehouse. More the no. of days / months an item is held in warehouse, it is said to old. The economic value of an item depends upon its quality, usage and relevance. Utility value of old items i.e., lying in godowns for a long time will be low.

The ageing schedule helps in assessing liquidity value of inventory. Higher the age lesser the liquidity of the firm. If many items are lying in godowns for a long time, it can be said that the liquidity of the firm is poor. A firm having more items of recent purchases will have more and more i.e., liquidity since their utility (in terms of quality) is high. From the following illustration - 14. 1. liquidity of the firm can be gauged.

**Illustration : 14.1**

Age of the items	Firm A (as in Lakhs)	% in total value	Firm B (Rs. in. Lakhs)	% in total value
1 month old	15.00	35%	35.00	65%
above 1 month and less than 3 months	20.00		30.00	
Above 3 months and below 6 months	30.00	30%	20.00	20%
Above 6 months and Below 1 year	35.00	35%	15.00	15%
Total	100.00	100%	100.00	100%

Now, firm B is more strong, in liquidity point of view as it has 65% (out of total value) of its inventory is 3 month old. Firm A is relatively poor state since of inventory position 65% of its inventory is purchased beyond 3 months. From this illustration it is evident that firm with latest purchases will be strong in business. Here both firms are holding inventories worth Rs. 100 lakhs each. But, Firm B is found to relatively be strong after analysis.

iv) **Safety stock :** It is the number of units to be maintained as cushion against delay in delivery of stocks. Normally manager of inventory do add safety stock while calculating average inventory.

Safety stock = Number of days likely delayed x Number of units consumed per day

$$\text{Average stock} = \left( \frac{\text{EOQ}}{2} + \text{safety stock} \right)$$

v) **Reorder point** : Reorder point is the level at which or when a firm has to place order for an inventory item.

vi) **Just - in - time (JIT)** : Normally, inventory costs are high and controlling inventory is complex because of uncertainties in supply, dispatching, transportation etc. Lack of coordination between suppliers and ordering firms is causing severe irregularities, ultimately the firm ends-up in inventory problems. Toyota Motors has first time suggested just - in - time approach in 1950s. This means the material will reach the points of production process directly from the suppliers as per the time schedule. It is possible in the case of companies with repetitive process. Since, it requires close coordination between suppliers and the ordering firms, and therefore, only units with systems approach will be able to implement it.

vii) **V . E . D analysis** : Stocks are divided into 3 categories such as Vital, Essential and Desirable. It will help manager to take inventory decisions in appropriate manner. Planning, controlling and other inventory decisions are taken more carefully and seriously for items of vital category, next comes Essential items and followed by Desirable items.

viii) **F . S . N analysis** : According to this approach, the inventory items are categorised into 3 types. They are fast moving, slow moving and non moving. Inventory decisions are very carefully taken in the case of 'not moving category'. In the case of item of fast moving items, the manager can take decisions quite easily because any error happened will not trouble the firm so seriously. Since risk is less in fast moving items, because they can be consumed quickly unlike the non - moving category which are carried in the godowns for more time period.

As risk is high in case of slow - moving and non- moving - items, the inventory decisions have to be taken carefully without affecting the objectives of profitability and liquidity of the organisation.

### 14.13 Measures to assess the inventory management

Following are the ratios in use to measure the effectiveness of the inventory management.

i) **Inventory turnover ratio** : Cost of goods sold / average total inventories. The higher the ratio, more the efficiency of the firm

ii) **Work in process turnover ratio**

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

Here, in this ratio also higher the ratio, more the efficiency of the firm.

iii) Weeks inventory finished goods on hand  $\tilde{O} = \frac{\text{finished goods}}{\text{Weekly of finished sales goods}}$

This ratio reveals that the lower the ratio, the higher the efficiency of the firm

iv) Weeks raw material on order  $\tilde{O} = \frac{\text{Raw material on order}}{\text{Weekly consumption of raw material}}$

This ratio indicates that the lower the ratio, the higher the efficiency of the firm.

v) Average age of raw material inventory  $\tilde{O} = \frac{\text{Average raw material inventory at cost}}{\text{Average daily purchases of raw material}}$

This ratio says that the lower the ratio the higher the efficiency of the firm.

vi) Average age of finished goods inventory  $\tilde{O} = \frac{\text{Average finished goods inventory at cost}}{\text{Average cost of finished goods manufactured per day}}$

This ratio comes that the lower the ratio the higher the efficiency of the firm.

vii) Out of stock index  $\tilde{O} = \frac{\text{No. of times out of stock}}{\text{No. of items requisitioned}}$

This ratio indicates the lower the ratio higher the efficiency of the firm.

viii) Spare parts index  $\tilde{O} = \frac{\text{Value of spare parts inventory}}{\text{value of capital equipment}}$

This ratio reveals that the higher the ratio the more the efficiency of the firm.

#### 14.14 Self assessment Questions

1. What is inventory and why should it be held?
2. Explain the costs attached to inventory ?
3. Discuss the advantages and disadvantages of carrying large inventories and too small quantities of inventories.
4. What is economic order quantity ? How do you calculate it ?
5. Explain just-in-time approach and its relevance in Indian Industries.
6. What are the stock - out costs ?

7. Discuss primary factors in the control of inventories ?
8. What is the risk return trade-off associated with inventory management ?
9. Explain the purpose of ABC inventory system.
10. Contrast the role the inventory plans in EOQ model and JIT model.
11. From the following what should be the ideal level of inventory

Annual consumption	=	1,00,000
Cost per of the material	=	Rs. 5/- per unit
Ordering cost	=	Rs.20/- per order
Inventory carrying cost	=	36% of the inventory cost
Lead time	=	30 days
Safety stock	=	20 days consumption.

12. A firm uses 1000 units of a product per year. Its carrying cost per unit is Rs.5/- and ordering cost is Rs. 50/-. It takes 15 days to receive a shipment after an order is initiated and the firm intends to hold inventories for 30 day's usage as a safety stock. Calculate the EOQ and reorder point.
13. XYZ Co. Ltd., uses 20,000 units every year. Inventory carrying cost is Rs.50/-. Cost per order is Rs.500/-. Decide the annual order costs and total inventory costs if the firm orders in quantities of 5,000, 10,000 respectively.
14. From the following data, suggest whether the firm can avail of the quantity discount.  
Annual usage - 10,000 units.  
Cost per order - Rs. 600/-  
Price Per unit Rs. 100/-  
Carrying cost 10% of inventory value
24. From the following information
  - i) Rank the items on the basis of usage value.
  - ii) Record the percentage of usage items
  - iii) Classify the items into 3 categories i.e., A, B and C



Item	Annual usage (number of items )	Price Per Unit (Rs.)
A	1400	200
B	6000	400
C	1200	500
D	300	600
E	1500	700
F	1300	800
G	8400	900
H	90600	100
I	4000	200
J	100	1000
K	50	1100
L	400	1200

**LESSON - 15****MANAGEMENT OF ACCOUNTS RECEIVABLES****OBJECTIVES**

After studying this lesson, you should be able to :

- \* understand the nature and characteristics of credit.
- \* know the meaning of accounts receivables and conceptual framework.
- \* explain the features of a sound credit policy and various aspects of accounts receivables.
- \* identify the extreme levels of credit policy, and their effects
- \* explain the steps in designing the credit policy.

**STRUCTURE**

- 15.1. Introduction**
- 15.2. Accounts Receivables**
- 15.3. Sound credit policy**
- 15.4. Extreme levels of credit policy**
- 15.5. Constituents of credit policy**
- 15.6. Steps in designing credit policy**
- 15.7. Summary**
- 15.8. Key words**
- 15.9. Self assessment Questions / exercises**
- 15.10. Further Readings.**

**15.1. Introduction**

Sales cannot be done for cash alone and Trade credit is inevitable in the modern business society which is the basis of accounts receivables. And credit is also allowed by many as a sales technique to maximize the sales and profit. Trade credit acts as bridge between producers, as funds will be tied up. Hence, accounts receivables management is also a vital aspect of working capital management.

In cash sales risk is zero whereas in credit sales risk is high, as the seller receives payment later for transfer of goods effected today. In the credit business, it is not only the uncertainty element but also depreated value of the which win seerved in the later date, i.e., a rupee received today is stronger than expected to receive tomorrow.

### 15.2. Account Receivables

Accounts receivables refers to the dues owed by the customers for goods purchased from the firm or services rendered by the firm in the ordinary course of business. Accounts receivablen implis futurity, i.e., cash will be received future though uncertain.

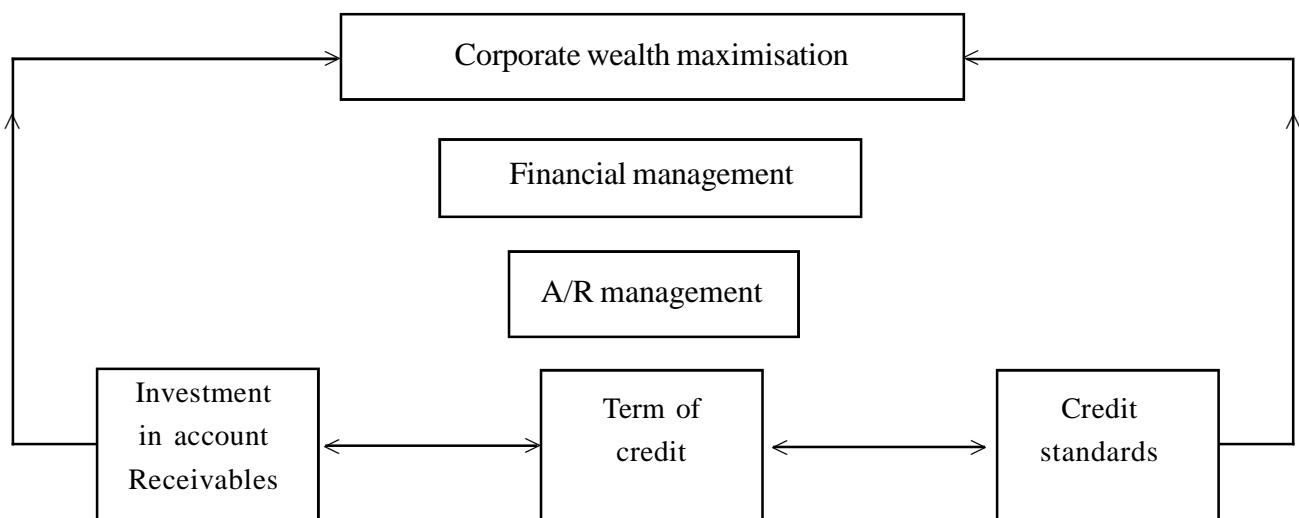


Diagram 15. 1. . . . . impact of credit on wealth maximization

### 15.3. Sound credit policy

The ultimate objective of a business firm is wealth maximization of shareholders. It is possible only when financial management is executed on sound lines. Accounts receivables management is the critical functional area of financial management. A business firm may be so good in many other areas, like production, finance marketing, etc. The firm will be a failure if it fails to collect cash and it does not matter even if does not sell on cash, provided its credit policy is sound.”

Thus a sound credit policy is an insurance to the entire business. It covers the following aspects:

- i) Investment in accounts receivables
- ii) Terms of credit
- iii) Standards of credit.

**15.3.1. Investment in accounts receivables :** Financial manager has to offer certain sales on credit, which means the credit sales is financed by the firm. Firms if rich in cash, credit extension is desirable. If firms are not strong financially, finance has to be obtained from outside which means inviting interest burden that goes to reduce profitability of the firm. So, financial manager has to reduce the capital tied up on credit sales.

**15.3.2. Terms of credit :** If credit terms are not competitive it will affect sales and consequently the shareholders' wealth. Here terms refers to what is the price if sold for cash. Otherwise, what is the credit period and cash discount, how much percentage for how many days are the issues. Like wise the financial manager has to decide as and when situation arises.

The costs associated with trade credit are :

- i) **Default costs :** All the debts will not be recovered, some of the debts are likely to become bad debts if the credit management is ineffective.
- ii) **Delinquency cost :** The firms during the recovery of bills incur costs such as legal expenses, reminder costs, travel, recovery charges, etc. All these will cause additional burden to the firms.
- iii) **Collection costs :** The collection department of the organisation will incur expenses such as telephone, fax, e-mail, correspondence, Net charges, stationary, postage, etc. These costs will be high and they depend upon the amount of debts.
- iv) **Opportunity costs :** The debtors delayed will not yield returns and remain as idle investment. and thereby the firm loses profitable opportunities of re-investment in business activities.

### 15.3.3. Determinants of credit Policy

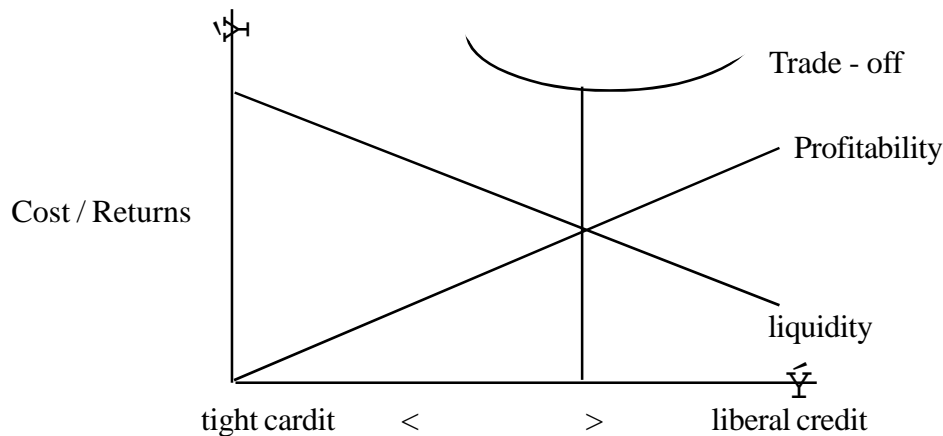
The following are the factors deciding the credit.

- i) Competition
  - ii) Producers capacity
  - iii) Buyers condition
  - iv) Marketing techniques
  - v) Trade practice.
- i) **Competition :** Competition is the important factor why seller makes credit sales. Producers always wish, to leave the goods from the factory premises as early as possible.
  - ii) **Producers capacity :** The more the producers financial capacity the more credit they allow to customers.
  - iii) **Buyers needs :** Buyers do wish to get on credit even if the prices are slightly high. It has become common habit to buy more if credit is easily available.

- iv) **Buyers status :** Buyers feel credit as if it a status. They buy more even though the price is slightly higher.
- v) **Marketing technique :** Companies use credit as a technique to maximise its sales and push the sales, to make more turnover and thereby more profit.
- vi) **Trade practice :** Credit has become a tradition both for production and buyers. So the practice is continued.

#### 15.3.4. Benefits of credit

Credit management is risky and it is known as riding on a double edged sword. If credit is not given sales will not increase Which is allowed as a chance of bad debts. Hence, every firm has to be careful in credit sales and credit extension. The firm has to trade off between benefits and costs of credit sales. The following diagram 15.2 will reveal the optimum level of credit to be maintained.



**Diagram 15.2 Optimum level of credit**

The higher the credit, more the sales which will go along to increase profits and wealth maximisation to share-holders. Simultaneously, this liberal credit policy of the firm may cause funds shortage and problem of it liquidity. As such a prudential financial manager has to be optimum in deciding the quantum of credit, standards and procedures as well as terms of credit.

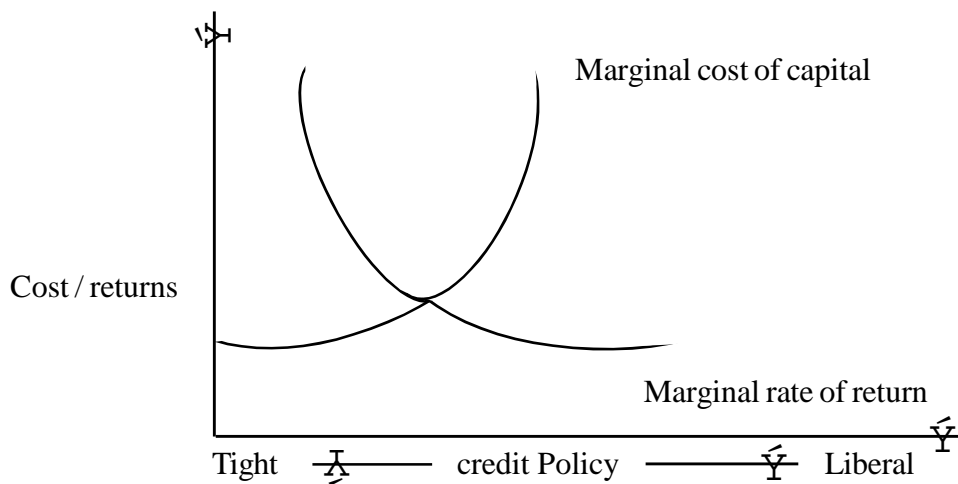
#### 15.4. Extreme levels of credit

The credit policy will never be balanced unless managed with all precautions. A rider on horse if not careful will get slipped. Similarly credit policy if not carefully designed will end of up in losses. The credit policies are deffrent types.

- i) Liberal credit policy
- ii) Stringent credit policy
- iii) optimum credit policy

- i) **Liberal credit policy** : Under this policy, the firm is ready to sell more on credit so as to maximize the sales. Profits will increase in liberal credit policy as a result of increased sales. More sales by way of liberal credit policy would also give rise to bad debts and losses there upon.
- ii) **Stringent credit policy** : The firm is highly careful in extending credit to customers. The financial manager through rigid standards often sacrifices profitable sales opportunities and profits in the name of rigid and cautious credit norms. Therefore, the objective of profit maximization is partially fulfilled.
- iii) **Optimum credit policy** : Sales increase by credit extension is associated with bad debt costs, because of defaulting accounts. Though return on credit sales increases firms returns, simultaneously firms liquidity is affected because of slow recovery of debts and at times no recovery of some of the debts.

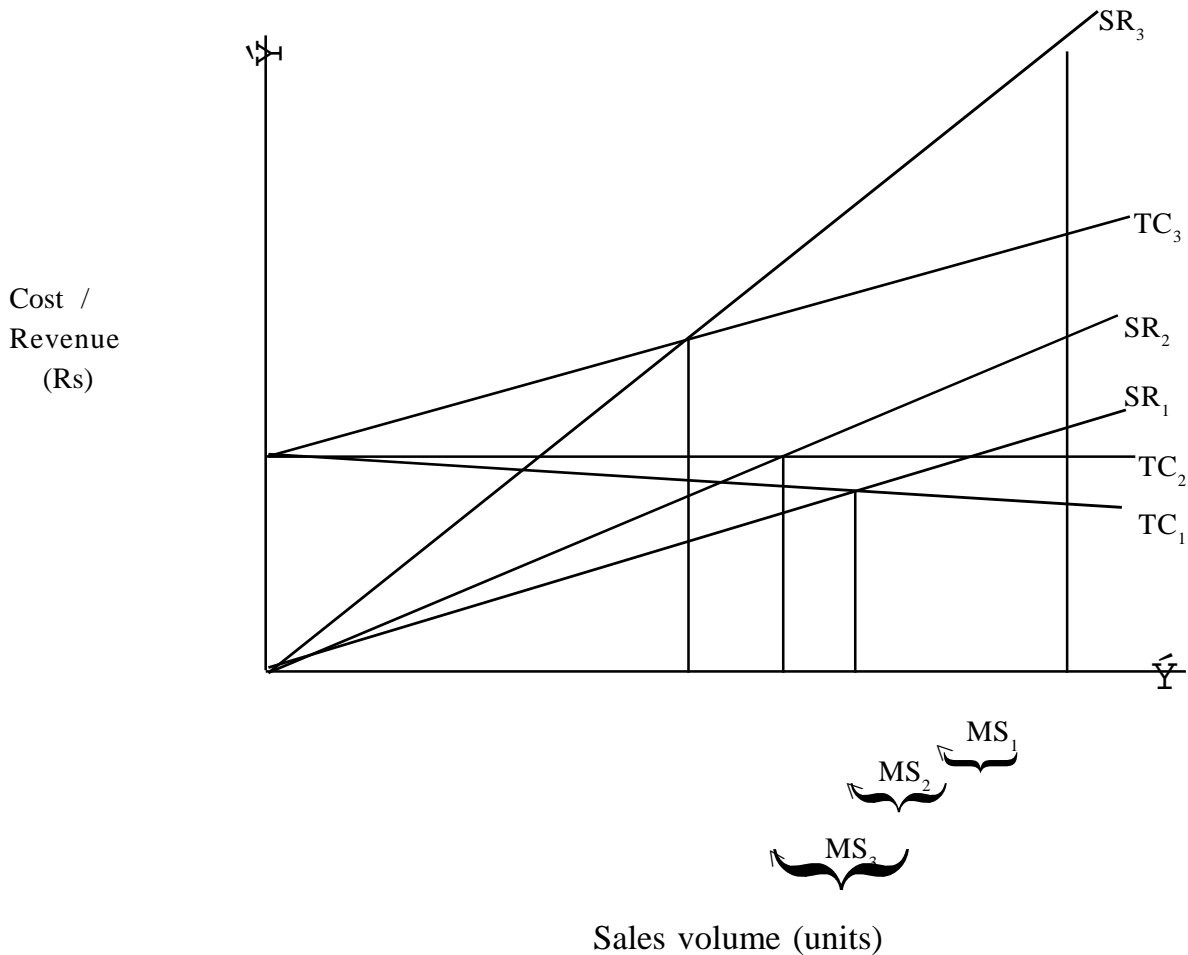
The optimum investment in credit can be shown in a graph where it is the intersection of the two curves i.e., marginal ratio of return on investment and marginal cost of capital.



**Diagram 15.3 Optimum level of credit**

Higher sales revenue through liberal credit policy demands more production as such firms encourage large scale production which will reduce the cost of production and thereby increases firms' margin of safety. This is shown graphically in diagram 15.4





**Diagram 15.4. . .**

**Illustration 15.10**

Quality Ribbons limited is engaged in the manufacturing of nylon ribbons each price total at Rs. 100/-. Variable cost per unit is Rs. 60/-. fixed cost of the company are Rs. 16 lakhs (annually). Last year sales is 8000 units. The company is contemplating to relax credit standards as a result expecting 10 per cent increase in sales, collection period is likely to go up from 30 to 45 days, bad debts are expected to be 2% and collection expenses to go up by Rs. 50,000/-. Company pays a commission of 10% (not included in variable cost). After the tax the rate of return is expected as 15% while corporate tax is 50%. Now you have to recommend, should company relax credit standards. ?

**Solution**

Additional sales (Rs)	8000 X 100 =	800000
Variable cost (Rs)	8000 X 60 =	480000
Gross margin (Rs)	=	<u>320000</u>

**Other cost**

Bad debts expenses	800000 X 2% = Rs.	16000
Commission	800000 X 10% = Rs.	80000
Collection expenses	Rs.	50000
		<u>146000</u>
Profit before tax		174000
Tax 50%		87,000
Profit after tax		<u>87,000</u>

Effects of changes

A/R collection X sales per day

A/R before changes =  $30 \times 8000000 \div 360 = 666667$

A/R after change  $45 \times 400000 \div 360 = 1100000$

Increase in investment of A/R = 4,33,333

Required return of additional investment =  $4,33,333 \times 15\% = 65,000$

But profit estimated above ----> 87,000

Hence, the proposal is acceptable

**15.5. Constituents of credit policy :**

The following 6 c's constitute the basic parameters of sound credit policy :

- i) credit standard
- ii) credit analysis
- iii) credit terms
- iv) credit control
- v) credit monitoring
- vi) collection policy

Credit standards have a bearing on sales of the firm. These standards refer to minimum requirements for the evaluation of credit worthiness of a customer. The company may be liberal or strict in defining the requirement in getting credit. The standards imposed by the company are to assess the credit worthiness of customers. As long as company's profitability is higher, it can lower credit standards which it would adversely affect the sales.

Following are the effects of lowering the credit standards.

- i) rise in sales
- ii) rise in collection period
- iii) rise in accounts receivables
- iv) rise in bad debts
- v) increase in servicing costs of accounts receivables

**Credit terms :**

Another aspect of account receivables management is deciding credit terms which include :

- i) Credit period
- ii) Credit discount
- iii) Credit limit
- iv) Collection procedure
- v) Credit investigation
- vi) Credit insurance

- i) **Credit period :** It is the period allowed by the seller to the customer to pay the bills. The customer can take advantage and pay conveniently his bills. Here the customers are interested in getting more credit period. But the firm has to decide optimally the period even if sales increases proportionately, the relaxation would cost nearly the firm as the funds will be blocked.
- ii) **Cash discount :** Cash discounts are in the form of discount rate and discount period. It is an incentive to the customer who pays early which many customers take advantage of cash discounts. Rarely some firms do not utilize the opportunity due to their funds tied up and not able to take advantage of as they have no cash balance. Of course this policy would result in loss of revenue of it. Therefore the management has to balance the benefits and costs before arriving a decision on cash discount.

**Illustration 2 :**

From the earlier example - quality ribbons is proposing 2/10 net 3 - and company expects collection period would fall to 18 days from 10 days.

**Solution :**

Loss of revenue	$30,00,000 \times 60/100 \times 2/100$	=	96,000
A/R before discount	$30 \times 80,00,000 / 360$	=	6,66,667
A/R after discount	$18 \times 80,00,000 / 360$	=	4,00,000
Release of investment		=	2,66,667
Return on funds released	$= 2,66,667 \times 15\%$	=	4,00,000 (approx)

Loss of revenue (96,000) is more than

Return on such funds i.e.,  $= 2,66,667 \times 15\% = 40,000$

Since, revenue loss (96,000) is more than return on such funds Rs. 40,000/-, the proposal is not desirable.

- iii) **Credit limits :** Credit sales decision cannot easily be made. While taking credit decision, besides character and capacity of the customer, the supplier has to decide several other things such as extent of credit and credit period. Some times, the supplier is asked to extend credit amount or credit period, for which the customer will not oblige either extra price or interest rate. Under such circumstances, the supplier has to weigh the profit out of extra sales against costs on account of such deal. As long as he makes reasonable gain in the deal he will say yes to extend extra credit period or credit extension.
- iv) **Collection procedure :** Procedure to collect bills from the customers should be such that the firm has to expedite collection. Such that they have enough funds to meet its creditors. The firms have to adopt such collection procedures by giving cash discounts for quick payments and price discounts for cash sales.
- v) **Credit investigation :** Always the accounts receivables management has to make credit investigation by approaching personally the prospective customers and also the existing customers. He has to collect their financial data and do the credit analysis. The firms should not hesitate to enquire the customers paying capacity and practices from time to time which is of course expensive. Every firm has to investigate about its creditors before going credit, otherwise the firm has to face lot of difficulties.
- vi) **Credit Insurance :** The debts are covered by credit insurance. Nationalised industries, governments department and local authorities are considered to be risk free, hence not included. Another method prevailing is special account policy, in this any business and any amount is covered.

**Illustration : 3.**

Suppose M/s Quality ribbons limited is interested in increasing credit period from 30 to 45 days, expecting 5% rise in sales. The bad debts will be 2.5 per cent of increased sales. The company would also incur Rs.20,000 for collection.

<b>Solution :</b>	<b>Rs</b>
Increase in sales	4000 X 100 = 4,00,000
Increase in variable cost	= <u>2,40,000</u>
Increase in gross profit	= 1,60,00
<b>Less : bad debts</b>	10,000
Collection charges	20,000
Commission	40,000 = -70,000
Profit before tax	= 90,000
Tax (50%)	= -45,000
Profit after tax	= <u>45,000</u>
Return investment of A/R	= $\frac{4500}{433300} \times 100$
	= 10.38 %

This is less than expected return hence This propse is rejected

**Credit analysis :** It refers to the investigation of customers' credit worthiness. It would involve the following steps:

- i) get the financial data
- ii) analyze credit worthiness
- iii) decide to grant or not to grant credit
- iv) refer past record of business
- v) take the opinion of sales personnel

- vi) get the credit assessment of the credit rating agencies, such as CRISIL, ICRA
- vii) send goods on trial basis before establishing market relations
- viii) ask customers to supply information substantiating his credit worthiness
- ix) analyze financial statements of customers
- x) obtain bank references
- xi) get the trade references

The company willing to grant credit would enquire about the 'prospective debtor' in the market and know about the intentions and plans from the speeches of the Chairman. With the help of the credit analysis, the customers are selected.

#### **Credit control :**

Several measures are taken to bring accounts receivables under control.

- i) **Prompt invoicing :** Even after delivery, invoicing is made slowly. This will give impression to the customers that invoice has not yet reached. After receiving the invoice, he starts calculating the credit period from the day he has received the invoice. So to quicken the collection, the suppliers should dispatch invoice immediately.
- ii) **Open item accounts :** In many firms, ways of collections are very slow and many invoices are turning to be bad debts due to lack of information such as which invoice in which stage. All the amount of each invoice is not collected at one time. Practically amounts are made partially and the payment is computed over a period of time. So for effective control the financial manager should have information invoice-wise, product-wise, division-wise, etc. and all these particulars be collected month-wise so that follow-up action can be initiated.

**Personal touch :** A credit manager has to be in touch with the customer personally if possible. Otherwise contact them over-phone, at-least. So that the customer will be serious and clear the pending dues. This kind of follow-up will bring the accounts receivables under control rather than regular reminders, where the customers act mechanically.

**Credit monitoring :** Accounts receivables are monitored through the following techniques :

- i) aging schedule
- ii) balance of payments pattern
- iii) payment matrix



**i) Aging Schedule :** Aging schedule is a technique to check and regulate the accounts receivables. According to this method, bills are listed on the basis of due dates. Then the total sum due from debtors is divided into different age groups. The following illustration on a hypothetical basis gives further information.

**Illustration 4 :**

Comparative statement of aging schedules of account receivables for firm A & B during  
2002 - 03

Firm A			Firm B		
Age	Amount	%	Amount	%	
Billing pending 30 days	10	50	2	10	
Bills pending Above 30 days And below 3	5	25	3	15	
Bills pending Above 3 months Below 6 months	3	15	5	25	
Bills pending Above 6 months Below 1 year	2	10	10	50	
Total	20	100	20	100	

From the above illustration both A and B firms appear to be equally strong since both firms claim that their A/R are same. But when their bills are wise categorised on age basis, it is evident that 50 % of the total A/R of firm B are kept not collected for reasons beyond the imagination ( only 25 % of the bills are 3 months only) Thus firm B, is weak and A is strong (75 % of the bills are 3 months old) in liquidity.

**ii) Balance of payments pattern :** In this method out of the total sales made in month wise payments received will be shown separately. It will reveal the extent of bills pending and yet to be received. This will help collection departments to know how it has received so far and how much is pending so, far and further measures can be taken for the delay in payment if delay is made. The following hypothetical illustration will explain the method.

**Illustration 5 :****Balance of payments patterns :**

Month	Payments(Rs)	%	Balance(Rs)	%
January	10,000	10	90,000	90
February	40,000	40	50,000	50
March	30,000	30	20,000	20
April	20,000	20	0	0

**Illustration 6 : Payment conversion matrix**

For analyzing the payments pattern for several months the following matrix is helpful.

Month	Sale	Jan	Feb	Mar	April	May	Jun	July	Aug	Sept	Oct
Jan	1,00,000		10,000	40,000	30,000	20,000					
Feb	80,000		21,000	28,000	22,000	9,000					
Mar	1,20,000				18,000	48,000	25,000	29,000			
April	1,60,000					19,500	72,500	38,000	30,000		
May	2,00,000						20,000	72,000	60,000	48,000	
June	1,60,000							14,500	56,000	49,000	40,500
Total	10,000		61,000	76,000	1,09,500	1,26,500		1,53,500	46,000	97,000	40,500

Looking at the conversion matrix one can judge whether the collection is improving, stable or deteriorating.

Customers are identified as:

- i) reliable customers,
- ii) highly reliable customers,
- iii) risky customers,
- iv) highly risky customers,

The following are the 5 elements that go into credit analysis in identifying a sound customer:

- a) Capital
- b) Character
- c) Collateral
- d) Capacity
- e) Conditions
- f) Post experience

- a) **Capital** : The customers repayment capacity depends upon his capital adequacy. In business one's financial position can be assessed by checking several ratios, especially liquidity and turnover ratios and also funds flow analysis. These exercises will help to reveal the customer's capital sufficiency and financial position of the business.
- b) **Character** : The customers should cooperate and have to pay the debts timely. Many a firm do not cooperate even though they have funds. Some firms even though they have 'will' to pay quickly are unable to meet due to lack of funds. Here character also plays role in deciding the repayment capacity. Hence, the character of a customer shall be enquired and investigated by collecting information about his earlier performance of payments or
- c) **Collateral** : The term collateral refers to the funds obtained by showing the assets as security if the customers failed to pay the creditors recover the credit amounts from the proceeds of the collateral assets. If a firm has more secured financing it implies that the firm is less creditworthy.
- d) **Capacity** : Capacity refers to the personnel, technology and entrepreneurial abilities of a firm. The firm's ability and willing to pay the debts depends upon capacity. This capacity can be understood from the recognition of the customer in the market or industry.
- e) **past experience** : While choosing a customer one has to look into not only the above aspects but also his history. How he has made payments previously. There fore it is better to verify old records, particularly when the customer asks for credit extension. Also it is desirable to know how he has made payment to others. Has he involved in legal issues previously? Has he caused troubles to others? Such enquiries and credit investigation will help in better serving the customers.
- f) **Collection policy** : Firms should be practical in their approach in collecting debts through regular correspondence, personal calls, telephone contacts, etc. The sudden reminders will not make the collection programs effective unless they take a follow up action and maintain personal relations. If the collection policy is not effective the company will incur large expenses and fail to be 'fund - rich'. So firms should trade -off between cost of collection and bad debt losses. A stitch in right time will save lot. The following diagram shows the relationship between losses due to bad debts and collection expenses.

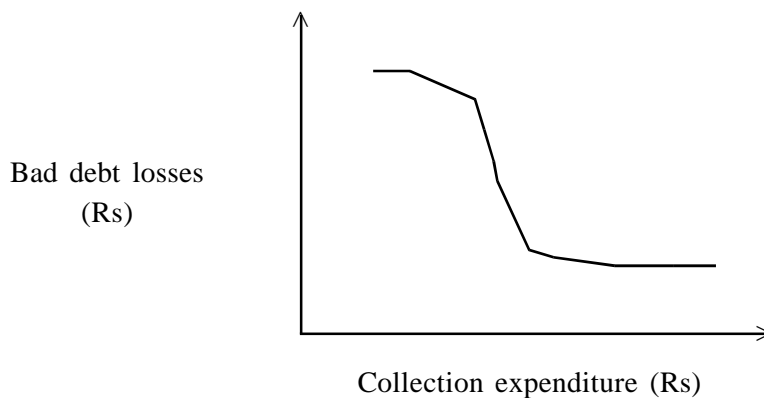


Diagram 15.5 : Trade - off between Bad debt losses and collection expenses.

**Evaluating collection department :** Evaluating collection department is a part of accounts receivables management. In this process, evaluation may be strict or liberal the management will assess the department and its functioning by using several ratios. If management is rigid, collection department will also be strict in sanctioning credit facilities thereby firm loses future sales. Otherwise the firm would involve in bad debts and problems of funds shortage. As such, it is felt by the experts of the financial management that every management should be optimum in its evaluation of credit management and be not foolish.

**Factoring :** Customers' credit is sold to factors who take the responsibility of collecting and charge for the service rendered. This is called Factoring. The service charges vary from firm to firm and the extent of undertaking risk of bad debts. Factoring is not same as financial management and controlling the accounts receivables. In UK Factors not only advance money against the invoices, but also undertake the responsibility of collecting the debts and also provide services to their clients.

### **Functions of Factors :**

**Finance :** The supplier sends the bills to the 'Factor' and takes finance by paying an extra of 2 % over bank rate of interest for the period, only from the date of advance to the date of payments by the customer. The firm will not show such finance as borrowings in their balance sheet, as this would reduce their borrowing ability from financial institutions. Hence, they show as if the bills are collected.

**Risk :** Factors by making finance available to their clients are taking credit risk. Factors collect from customers according to the normal terms of the suppliers. They are not hard –faced Some popular companies do not take the services of Factors.

**Charges of Factoring :** Factoring charges 1 to 2 % for the service they extend on the invoice value. And it varies from company to company. Factors also refuse some sectors that they do not know about the inside knowledge of the business. In such cases they only assist in getting the bills collected.

### **15.6. Steps/ measures to design a sound credit policy.**

- i) evolve well defined plan and program.
- ii) conduct periodical trade enquiries from other customers in the area.
- iii) interpret and analyse financial statements to know financial position.
- iv) develop coordination and team spirit among different departments.
- v) conduct periodical review and up- date ratings or grading the existing customers.
- vi) apply tools and techniques to weed out the bad ones in letter and spirit
- vii) make credit policy clear and unambiguous to all the concerned.
- viii) selectively give extension of credit.
- ix) keep and maintain personal contacts with customers.

- x) contain collection departments occasionally.
- xi) seriously look into long pending debtors.
- xii) rupee not collected neither earns profits nor recovered.
- xiii) train up sales force to pay an eye on collections.
- xiv) send invoices immediately.
- xv) send remainders periodically.
- xvi) insure accounts receivables
- xvii) set and re-set credit limits to customers
- xviii) optimise investment in accounts receivables.
- xix) establish credit standards.
- xx) minimise cost of credit
- xxii) be selective in choosing customers

#### 15.11. Self Assessment Questions / Exercise

1. What are the objective of receivables management. Diss cuss the importance of credit policy
2. How do you manage credit policy in an enterprise?. Discuss the effects of tight credit policy
3. What are the financial implications of liberalised credit policy?
4. Explain the cost benefit trade off in receivable management
5. Suggest steps to be taken to effect control of debt collection by are efficient credit control system.?
6. What factors determine credit policy of an enterprise?.
7. Define factoring Explain features of factoring

25. A company sells a product at Rs.40 per unit with the variable cost of Rs.20 per unit. The total fixed costs amount to Rs.16,25,000 per annum and the total sales are Rs 1,75,00,000. It is estimated that if the present credit facility of two months were double sales could be increased by Rs.60,00,000 The company expects a return on investment of atleast 75 % prior to taxation. Should the company release the credit period?

26. A firm is considering an increase in its credit period from 40 to 60 days. It currently sells 5,00,000 units at Rs.2 per unit. The average age of receivables is 50 days; the variable costs per unit is Rs.15.70 and the average cost per unit is Rs.18.70.The change in the credit period is expected to increase the sales by 3,15,000 units and the average collection period to 80 days. Assume the required return on investment as 20%, should the firm carryout the proposal. (Assume 360 days year).

27. A firm sells 1,40,000 units of a product per annum at Rs.155 per unit. The average cost per unit is Rs.21 and the variable cost per unit is Rs.38. The average collection period is 65 days and bad debt losses are 2.3% of sales and the collection charges amount to Rs.65,000.

The firm is considering the proposal to follow a strict collection policy which would reduce bad debt losses to 1 % of sales, average collection period to 45 days. It would however reduce sales volume by 10,000 units and increase the collection expenses to Rs.125,000. The firm's required rate of return is 20%. Would you recommend the adoption of new collection policy? (Assume 360 days in a year)



## LESSON - 16

**VALUATION OF FIRM****Objectives**

After studying this lesson, students are able to

- understand the concepts of Value and need for valuation of securities;
- explain the various methods employed for valuation of securities;
- realise the influence of time value of money in valuation of securities.
- examine the impact of factors like net assets; actual dividend, earning rate over the value of the firm.

**STRUCTURE**

- 16.1 : Introduction**
- 16.2 : Concept of Value**
- 16.3 : Need for Valuation**
- 16.4 : Valuation of Bonds or Debentures**
- 16.5 : Valuation of Preference Shares**
- 16.6 : Valuation of Common Stock**
- 16.7 : Summary**
- 16.8 : Keywords**
- 16.9 : Self Assessment questions**
- 16.10 : Further Readings**

**16.1 INTRODUCTION**

In the previous lessons it was emphasized that the objective of the firm is to maximise the shareholder's wealth. The shareholder's wealth is the product of number of shares and the current market price per share.

$$W = N \times P_o$$

Where

$W_o$  = Shareholders' wealth

$N$  = Number of shares held by the share holders

$P_o$  = Current market price per share

Given the number of shares, the wealth of firm's shareholders increases when the price per share increases. Therefore, the financial goal of a firm is to maximise the market value per share. The value of the firm depends on two factors namely (a) the rate of return; and (b) the element of risk. The term return refers to the profits that the firm can earn for the shareholders and the concept of risk refers to the uncertainty of these profits.

Where,  $r = R(r, \sigma)$   
 $V =$  The value of the firm  
 $r =$  return  
 $\sigma =$  risk

The return and risk in turn are influenced by the three financial decisions viz (i) investment decisions (I); (ii) financing decisions (F); and (iii) Dividend decisions (D). Therefore, the value of the firm can be represented as

$$V = f(\text{IFD})$$

The Financial Manager must develop a valuation model which is essentially based on the concepts of the value of money and risk - return relationship.

## 16.2 CONCEPTS OF VALUE

There are different concepts of value used for different purposes. The various concepts of value are :

### a) True value or Present value

You have already studied the concept of Present value under 'Capital Budgeting' and in the discussion about 'time value of money'.

Value of the firm depends upon the net cash inflows generated by the firm's assets and also on the future returns. Therefore, the amount of cash inflows and the risk associated with the uncertainty of future returns form the basis of valuation. When cash inflows are discounted at the required rate of return (minimum rate expected by the investors) to account for their timing and risk, we get the present value of the firm. Therefore:

$$V = \frac{C_1}{(1+k)^1} + \frac{C_2}{(1+k)^2} + \dots + \frac{C_n}{(1+k)^n}$$

$$V = \sum_{t=1}^n \frac{C_t}{(1+k)^t} \text{ where } t = 1 \text{ to } n$$

Where,

$V =$  Value of the asset

$C_1, C_2 =$  Expected Cash inflows at the end of the period. (CFAT)

$K =$  Discount rate.

$n =$  expected life of the asset

For example, if the annual Cash inflows (CFAT) expected to be generated by an investment project for the next ten years is Rs.1000 per year and the appropriate rate of discount is 15%, the value of the firm is

$$V_0 = \sum_{t=1}^{10} \frac{\text{Rs.1000}}{(1+.15)^t}$$

Using the present value of annuity table/referring to present value of annuity corresponding to 15% interest rate and 10 year period

$$\text{Rs.}1000 (5.019) = \text{Rs.}5019$$

Therefore the present value is Rs.5,019.

### b) Liquidation Value

In case the firm decides to go out of business, the net value of assets, or liquidation value would be of primary concern. After terminating the business, the amount which will be realised from the sale of assets is known as Liquidation Value. Liquidation Value is minimum value which a firm might accept if it sells its business.

$$\text{Liquidation value per equity share} = \frac{\text{Value realised from liquidating all the assets of the firm} - \text{Amount paid to all the Creditors and Preference Shareholders.}}{\text{Number of Equity Shares Outstanding,}}$$

### c) Going concern value

It is the amount that a firm could realize if it is sold as an operating business. Going concern value is always higher than the liquidation value. The difference between these two values is due to the value of intangibles. In a going concern, the assessment of the value of existing mixture of assets which provide a stream of income is done.

### d) Book-Value

It is calculated from the financial reports particularly the balance sheet prepared by the firm. The excess of assets over debts represents networth and provides the base for the calculation of book-value. If a company has got outstanding preference shares, the value of such shares is deducted to determine the networth available to ordinary shareholders. The networth available to ordinary shareholders divided by the number of ordinary shares outstanding gives the book-value per share. Thus the book-value reflects the historical cost.

$$\text{Book Value} = \frac{\text{networth available to ordinary shareholders}}{\text{number of ordinary shares outstanding}}$$

Book value per equity share is equal to networth (i.e. paid up equity capital plus reserves and surplus minus accumulated losses) divided by the number of equity shares outstanding.

Book values are useful in appraising companies whose assets are largely liquid and subject to accurate accounting values such as banks, financial corporations etc.

### e) Market Value

Market value of an asset or security is the current price at which the asset or security is being sold or bought in the market. For a profitable firm, the market value per share is generally higher than the book-value.

**f) Intrinsic Value**

The intrinsic value is the price which is determined on the basis of primary factors. It is the real worth of the equity which is distinguished from the current market price. The financial manager estimates the intrinsic value by carefully appraising the following fundamental factors which affect the security values.

- i) **value of assets:** the physical assets held by the firm have some market value. They can be liquidated if necessary, to provide funds to repay debt.
- ii) **future earnings:** expected future earnings of the firm are generally viewed as the most important factor affecting the value.
- iii) **future interest and dividends:** for debt the firm is committed to pay interest and repay principal. For common stock, the firm attempts to declare and pay dividends. The likelihood of these payments affect the present value.
- iv) **future growth rate:** the future growth rate is evaluated by the investors from time to time and is an important determinant of the intrinsic value of equity stock.

**g) Appraisal Value**

There are three types of appraisal values used under different circumstances. One is the liquidation value which attempts to judge the value of the firms assets in case the firm is wound up. Second method of appraisal is replacement value which attempts to judge the cost of replacing the asset. Third method of appraisal is the earning power value which involves evaluation and consideration of the expected earnings, risk associated with the earnings and timing of the returns.

**16.3 NEED FOR VALUATION**

The need for valuation of securities arises under the following situations.

- i) investment appraisal of securities.
- ii) majority controlling interest in a company, proposing to take over minority interest and vice-versa.
- iii) amalgamation of companies.
- iv) re-organisation of share capital resulting in the conversion of shares of one class into another.
- v) compensation on acquisition of shares.
- vi) Valuation under tax laws and other government regulations like wealth tax, gift tax, income tax and so on where the current values have not been established or not considered appropriate for the specific purpose.

## 16.4 VALUATION OF BONDS

A bond or debenture is a long term debt instrument. The expected cash inflows from bonds or debentures are the annual interest payments plus principal amount to be repaid on maturity. It is relatively easy to determine the present value of a bond since its cash flows and discount rate can be determined without much difficulty. The appropriate discount or capitalization rate depends upon the riskiness of the bond. The degree of risk depends upon the type of security held. A lower discount rate would be applied to the cash flows of the Government bond and a higher rate to the cash flows of the company debenture.

### Types of bonds:

Bonds are of two types : (a) bonds with a maturity period (b) perpetual bonds

#### (a) Bonds with a maturity period

When bonds have a definite maturity period, their valuation is determined by considering the annual interest payment plus their maturity value. The valuation of the said bonds under three situations are (i) annual interest payment (ii) half-yearly interest payment, are made and (iii) amortisation of bond amount, take place.

i) **Annual interest payment** : using the present value concept, the discounted values of these flows are calculated by using the following formula :

$$V_d = \frac{I_1}{(1+K_d)^1} + \frac{I_2}{(1+K_d)^2} + \dots + \frac{I_n}{(1+K_d)^n} + \frac{M_n}{(1+K_d)^n} \text{ or}$$

$$V_d = \sum_{t=1}^n \frac{I_t}{(1+k_d)^t} + \frac{M_n}{(1+k_d)^n}$$

Where,

$V_d$  = present value of a bond or debenture

$I_t$  = Annual interest in period t, (par value of a bond x coupon interest rate)

$K_d$  = Required Rate of return

$M_n$  = maturity value of a bond in period 'n'

n = number of years to maturity

#### Example : 1

An investor is considering the purchase of a 8% Rs.1,000 bond redeemable after five years at par. The investors required rate of return is 10%. What should be willing to pay now to purchase the bond?

**Solution:**

$$V_d = \frac{I_1}{(1+K_d)^1} + \frac{I_2}{(1+K_d)^2} + \dots + \frac{I_n}{(1+K_d)^n} + \frac{M_n}{(1+K_d)^n}$$

After substituting the given values in the above formula you get.

$$V_d = \frac{80}{(1+10)^1} + \frac{80}{(1+10)^2} + \frac{80}{(1+10)^3} + \frac{80}{(1+10)^4} + \frac{80}{(1+10)^5} + \frac{1000}{(1+10)^5}$$

Using the present value tables, you will get

Year	(CFAT) Rs.	factor at 10%	Present Value of cash flows (Rs. )
1	80	.909	72.72
2	80	.826	66.08
3	80	.751	60.08
4	80	.683	54.64
5	80	.621	49.68
5	1000	.621	621.00
Total present value of cash flows:			924.20

Thus, the investor would be willing to pay Rs.924.20

Alternatively, you can also calculate the value of a bond by using present value Annuity Table.

$$V_d = I (PVIFA_{k_d,n}) + M(PVIF_{k_d,n})$$

Where,

I = Annual interest, M = Maturity value,

PVIFA = Present Value of Annuity (referring to the present value Annuity Table corresponding to 10% interest rate and 5 years period).

PVIF = Present value of inflows (referring to the Present Value Table corresponding to 10% interest rate and 5 years period).

$$V_d = 80 (FVIFA_{10\% 5 \text{ yrs.}}) + 1000 (PVIF_{10\% 5 \text{ yrs.}})$$

$$\begin{aligned} V_d &= 80(3.791)+1000(.621) \\ &= 303.28+621 \\ &= \text{Rs. } 924.28 \end{aligned}$$

## ii) Half-Yearly Interest payments

In case interest on bonds/debentures is paid half-yearly, value of a bond is ascertained by using the following formula.

$$V_d = \sum_{t=1}^{2n} \frac{I_t}{(1+K_d/2)^t} + \frac{M_n}{(1+K_d/2)^{2n}}$$



Where,

$K_d$  = required rate of Return.

$M_n$  = maturity value of a bond in the 'n' th year.

$n$  = maturity period expressed in terms of half-yearly period

$I_t$  = annual interest in period 't'

### Example : 2

A Rs.100 par value bond carries coupon rate of 12% and a maturity period of 8 years. Interest is paid semi-annually. Compute the value of a bond, if the required rate of return is 7% on semi-annual basis.

### Solution:

$$V_d = \sum_{t=\frac{1}{2}}^{2 \times 8} \frac{1/2 (12)}{(1+.07)^t} + \frac{100}{(1+.07)^{2 \times 8}}$$

The value of a bond is calculated with the help of present Value Table.

$$\begin{aligned} & 1/2 (\text{PVIFA } 7\% \text{ 16 yrs.}) + M_n (\text{PVIF } 7\% \text{ 16 yrs.}) \\ & = 6(9.447) + 100(.339) \\ & = 56.682 + 33.90 \\ & = \text{Rs. } 90.582 \end{aligned}$$

### iii) Amortisation of bond amount

A bond or debenture amount may be amortised every year. In such a case, the principal amount will decline with annual payments and the interest is calculated on the outstanding amount.

### Example : 3

The financial institution is proposing to sell a 5 years bond of Rs.1,000 at 8% rate of interest per annum. The bond amount will be amortised equally over its life. If an investor has a minimum required rate of return of 7%, what is the present value of a bond?

### Solution:

In the above example, the amount of interest will go on reducing because the outstanding balance at the end of each year will be decreasing due to amortisation.

Table showing outstanding, balance, interest and cash outflows.

Year	outstanding balance at end of the year (bond value - amortisation)	interest @ 8% on outstanding balance	cash outflows amortisation+interest
1	Rs. 1000	Rs.80	Rs.280
2	Rs.1000-200 = 800	Rs.64	Rs.264
3	Rs. 800-200 = 600	Rs.48	Rs.248
4	Rs. 600-200 = 400	Rs.32	Rs.232
5	Rs. 400-200 = 200	Rs.16	Rs.216

$$V_d = \frac{I_1 + M_1}{(1+K_d)^1} + \frac{I_2 + M_2}{(1+K_d)^2} + \dots + \frac{I_n + M_n}{(1+K_d)^n}$$

Where,

$V_d$  = Bond value :

$M_1, M_2, \dots$  = Amount of amortisation:

$K_d$  = Required rate of return

$I_1, I_2, \dots$  = Interest amount received annually

$$V_d = \frac{(80+200)}{(1+.07)} + \frac{(64+200)}{(1+.07)^2} + \frac{(48+200)}{(1+.07)^3} + \frac{(32+200)}{(1+.07)^4} + \frac{(16+200)}{(1+.07)^5}$$

Using the present value tables, the value of bond is calculated as follows:

$$\begin{aligned} &= (280 \times .935) + (264 \times .873) + (248 \times .816) + (232 \times .763) + (216 \times .713) \\ &= 216.80 + 230.47 + 202.37 + 177.02 + 154 \\ &= \text{Rs.}1025.66 \end{aligned}$$

Thus, the Bond value = Rs.1025.66

### b) Perpetual or Irredeemable Bonds

Bonds that will never mature are known as perpetual bonds. In case of the perpetual bonds, as there is no maturity, the value of the bonds would be equal to the discounted value of the infinite stream of interest payments, i.e.,

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

Where,

$V_d$  = Value of bond

$I$  = Annual interest

$k_d$  = required rate of return

### Example : 4

Debentureholder is to receive an annual interest of Rs.100 on his perpetual debenture of Rs.1,000. Calculate the value of debenture if the required rate of return is 15%.

**Solution:**

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

Given values  $I = 100, i = .15$

$$V_d = \frac{100}{.15} = \text{Rs.}667$$

**Yield to maturity:**

So far, we have seen the method of valuation of a bond when the information relating to rate of interest, maturity value and required rate of return are given. When the information about the current market price, coupon rate of interest and the maturity value of a bond is given, its yield to maturity or rate of return can be calculated by using YTM concept. YTM of a bond is the rate of return earned on a bond if it is held to maturity. YTM is the rate of return that equates the current market price of a bond with the discounted value of its future interest payments and the terminal principal repayment of the bond.

The yield to maturity is a complex computation based upon a rather simple idea. It is the discount rate that equates the present value of all cash flows from a bond to the cost (current market price).

The YTM can be calculated by using the following formula.

$$MP = \sum_{t=1}^n \frac{I_t}{(1 + YTM)^t} + \frac{M_n}{(1 + YTM)^n} \quad \text{or} \quad P_o = \sum_{t=1}^n \frac{I_t}{(1 + r)^t} + \frac{TV}{(1 + r)^n}$$

MP or  $P_o$  = Current market price of a bond or debenture.

TV or  $M_n$  = Maturity value of a bond at the 'n' th years

$I_t$  = Annual interest payments period t

n = Number of years to maturity.

r or YTM = yield to maturity or discount rate

YTM can be approximated and tedious calculations can be avoided by using the following formula :

$$\text{Approximate YTM} = \frac{I + (F-P)/n}{(F+P)/2}$$

I = Annual interest

F = Face value of the debenture / bond

p = present value / market price of the debenture

n = years to maturity

**Example : 5**

The current market price of a debenture is Rs. 400 with coupon rate of interest 15% and face value of Rs. 500. The debenture has a maturity of 5 years from now. Find out the yield to maturity of the debenture.

$$MP = \sum_{t=1}^n \frac{I_t}{(1 + YTM)^t} + \frac{M_n}{(1 + YTM)^n}$$

$$Rs. 400 = \sum_{t=1}^5 \frac{Rs. 75}{(1 + YTM)^t} + \frac{Rs. 500}{(1 + YTM)^5}$$

What is required in this case is value of YTM which equates Rs. 400 with the sum of present value of Rs. 75 per year for 5 years and Rs 500 receivable at the end of the fifth year, clearly a process of trial and error is indicated. Several values of YTM can be tried till the equating value emerges. Trial can be started with the coupon rate, the next trial rate can be increased if the present value of the preceding trial exceeds the current market price and vice versa.

Thus, trying at 15% the following present value of the right hand side cash flows is estimated.

$$\begin{aligned} PV_{15\%} &= \text{Rs. } 75 \text{ per year} \times \text{PVIFA, 5 years at 15\%} + \text{Rs. } 500 \times \text{PVIF 5 years at 15\%} \\ &= 75 \times 3.3522 + 500 \times .4972 \\ &= 251.42 + 248.60 = 500.02. \end{aligned}$$

Since the present value of Rs. 500.02 exceeds Rs 400, a higher discount rate must be used.

The second trial may be made at 20%

$$\begin{aligned} PV_{20\%} &= \text{Rs. } 75 \text{ per year} \times \text{PVIFA, 5 years at 20\%} + \text{Rs. } 500 \times \text{PVIF 5 years at 20\%} \\ &= 75 \times 2.9906 + 500 \times .4019 \\ &= 224.295 + 200.95 = 425.245. \end{aligned}$$

Even the second trial has failed to equate the two values. Hence, you can go over to the third trial at, say, 24%.

$$\begin{aligned} PV_{24\%} &= \text{Rs. } 75 \text{ per year} \times \text{PVIFA, 5 years at 24\%} + \text{Rs. } 500 \times \text{PVIF 5 years at 24\%} \\ &= 75 \times 2.745 + 500 \times .3411 \\ &= 205.91 + 170.55 = 376.46. \end{aligned}$$

The third trial has lowered the present value to Rs. 376.46 which is less than Rs 400. Hence the required YTM must lie between 20% and 24%.

The exact YTM can be obtained by interpolating the values of 20% and 24%.

$$\text{Interpolation: Lower rate} + \left[ \frac{\text{excess of PV of cash inflows}}{\text{diff in the PV of cashflows}} \times \text{dif. the discount rates} \right]$$

$$\begin{aligned} \text{YTM} &= 20\% + \frac{425.245 - 400.00}{425.245 - 376.46} \times (24\% - 20\%) \\ &= 20 + \frac{25.245}{48.785} \times 4 = 20 + 2.07 = 22.07 \end{aligned}$$

Approximate YTM for the above said example, can be calculated as :

$$\text{Approx. YTM} = \frac{I + (F-P)/n}{(F+P)/2} = \frac{75 + (500-400)/5}{(500 + 400)/2} = \frac{75+20}{450} = \frac{95}{450} = 21.11\%$$

### 16.4.1 BOND VALUATION THEOREMS

Based on the bond valuation model, several bond value theorems have been derived. They state the effect of the following factors on the bond values.

- i) relationship between the required rate of return and the coupon rate
- ii) number of years to maturity

**i) Relationship between the required rate of return and the coupon rate**

- a. When the required rate of return is equal to the coupon rate, the value of a bond will be equal to its par value.
- b. When the required rate of return is greater than the coupon rate, the value of a bond will be less than its par value.
- c. when the required rate of return is less than the coupon rate, the value of a bond will be more than its par value.

**ii) Number of years to maturity**

- a. When the required rate of return is greater than the coupon rate, the discount on the bond declines as maturity approaches.
- b. When the required rate of return is less than the coupon rate, the premium on the bond declines as maturity approaches.
- c. The longer the maturity of a bond, the greater is its price change in response to a given change in the required rate of return.

**16.5 VALUATION OF PREFERENCE SHARES**

Preference shareholders enjoy preferential treatment both at the time of payment of dividend and also at the time of return of capital. The rate of dividend on preference shares is fixed. Like bonds, preference shares issued by the company are also of two types namely redeemable preference shares and irredeemable (perpetual) preference shares.

**i) Redeemable preference shares:** In case of these shares, the value of a share would be equal to the present value of annual dividend plus the present value of the amount payable on maturity.

$$V_p = \text{Present value of annual dividends} + \text{Present value of the maturity value.}$$

**Example : 6**

From the following data calculate the value of a preference share

Face Value of a preference share	Rs.100
Dividend rate	10%
Current market rate	15%
Maturity period	10 years
Discount factor at 15% for annuity of Re.1 for 10 years	5.019
Discount factor at 15% for present value of Re.1 payable after 10 years	.247

**Solution:**

$$\begin{aligned} \text{Value of a preference share } (K_p) &= (\text{Annual dividend} \times \text{Pv of annuity}) + (\text{Face Value} \times \text{PV}) \\ &= (10 \times 5.019) + (100 \times .247) = 50.19 + 24.7 = 74.89 \end{aligned}$$

Hence, the value of a preference share is Rs.74.89

ii) **Irredeemable preference shares** : The value of irredeemable preference share can be found by applying the following formula :

$$V_p = \frac{D_p}{K_p}$$

Where,

$V_p$  = Value of a preference share

$D_p$  = Dividend on preference share

$K_p$  = Required rate of return on preference share

### Example : 7

A company issued some irredeemable preference shares of Rs.100 each carrying a dividend rate of 10%. Such type of preference shares now carry a dividend of 15%. Calculate the value of a preference share.

### Solution :

$$V_p = \frac{D_p}{K_p}$$

Given values  $D_p = 10$ ,  $K_p = .15$

Putting the given values in the above formula, you will get

$$V_p = \frac{10}{.15}$$

Here, the value of a preference share is Rs.67/-

### Yield on Preference Shares

It can also be calculated on the same pattern as in the case of debentures, which is already explained.

## 16.6 VALUATION OF EQUITY SHARES

Equity shares do not carry a fixed dividend and the payment of dividend is discretionary. There is a greater degree of uncertainty regarding dividends. The earnings on equity shares in the form of dividend are expected to grow unlike interest on debentures and dividends on preference capital.

**Approaches for valuation of common stock:** There are two approaches for valuation of equity shares. They are:

- a) dividend capitalisation approach
- b) earnings capitalisation approach

### a) Dividend capitalisation approach

According to this approach, the value of an equity share is equivalent to the present value of future dividends plus the present value of the price expected to be realised on its resale. This approach is based on the assumption that dividends are regularly paid annually.



Equity is valued on the basis of the above approach depending on whether equity is held for

i) a single period or ii) a multi-period

### i) Single period valuation

It is presumed that the investor intends to buy a share and hold it for a year only. Equity share value will be equivalent to the present value of dividend at the end of one year plus the present value of the price which he expects to receive on selling the share.

Thus,

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

Where,

$P_0$  = current price of the equity share

$D_1$  = dividend per share expected at the end of the first year

$P_1$  = expected market price of the share at the end of the first year

$K_e$  = required rate of return

### Example : 8

Mr.X holds an equity share giving him an annual dividend of Rs.20. He expects to sell the share for Rs.180 at the end of a year. Calculate the value of the share if the required rate of return is 12%.

### Solution:

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

Given values,  $D_1 = \text{Rs.}20$ ;  $P_1 = \text{Rs.}180$ ;  $K_e = 12\%$

Putting the given values in the above formula you get

$$\begin{aligned} P_0 &= \frac{20}{(1+.12)} + \frac{180}{(1+.12)} \\ &= 17.86 + 160.71 \\ &= 178.57 \end{aligned}$$

Here, the value of equity share is Rs.178.57

### ii) Multi-Period Valuation

Equity Shares have no maturity period. Hence, it may be reasonable to presume that an equity shareholder in general expects cash inflows in the form of dividends not for a year but for an infinite duration. The value of an equity is therefore, equivalent to the present value of its future stream of dividends. In case the dividend per share remains constant, value of an equity can also be found out on the same basis on which the value of perpetual bond is calculated. (Zero growth rate in dividend)

$$P_o = \frac{D_e}{K_e}$$

Where

$P_o$  = Value of an equity share

$D_e$  = Expected annual dividend

$K_e$  = Capitalisation rate / required rate of return.

### Example : 9

A Company is presently paying a dividend of Rs.6 per share and is expected not to deviate from this in future. Calculate the value of the share, if the required rate of return is 15%.

$$P_o = \frac{D_e}{K_e}$$

Given values,  $D_e = \text{Rs.}6$  ;  $K_e = 15\%$

$$P_o = \frac{\text{Rs}6}{.15} = \text{Rs.}40$$

Therefore, the value of share is Rs. 40.

### Growth in Dividends

In the above model, it is assumed that dividend per share remains constant year after year. However, this presumption is unrealistic. The earnings and dividends of most of the companies grow over time because of their retention policies. As a result of this, the company would have an increased earning per share every year, if the number of shares do not change. Therefore the growth rate of dividends may be constant, and multiple.

### Constant Growth

If the dividends grow at a constant rate, it is a case of constant normal growth.

$$\text{Growth in dividends} = \frac{\text{Dividends in the 2}^{\text{nd}} \text{ Year} - \text{Dividends in the 1}^{\text{st}} \text{ year}}{\text{Dividends in the 1st year}} \times 100$$

(growth rate = retention ratio x return on equity)

$g = b \times \text{ROE}$  (In evaluating the equity shares, it is assumed that dividends grow at a constant rate.)

$$P_o = \frac{D_o (1+g)}{(K_e - g)} = \frac{D_1}{(K_e - g)}$$

Where,

$P_o$  = current market price of equity share

$K_e$  = capitalisation rate.

$g$  = growth rate in dividends

$D_1$  = dividend at the end of the year

Constant growth of dividends formula i.e.  $\frac{D_1}{K_e - g}$  is based on the following assumptions:

- i) the Capitalisation rate must be greater than the growth rate (i.e.  $K_e > g$ ). If  $K_e < g$ , it results in a negative price.
- ii) the initial dividend is greater than 0 (i.e.  $D_1 > 0$ ), otherwise price will be zero.
- iii) the relationship between  $K_e$  and  $g$  is assumed to be constant and perpetual.

### Example : 10

XYZ is expected to grow at the rate of 6% per annum. The dividend expected on a share is Rs.2.00. Calculate the price of an equity share if the required rate of return is 14%.

**Solution:**

$$P_o = \frac{D_1}{(K_e - g)}$$

Given values,  $D_1 = \text{Rs. } 2$ ;  $K_e = 14\%$ ,  $g = 6\%$

Putting the given values in the above formula you will get,

$$P_o = \frac{\text{Rs. } 2}{.14 - .06} = \text{Rs. } 25$$

Thus, the price of an equity share is = Rs.25/-

If the dividends grow at a constant compound growth rate, dividend for a given year is calculated by using the following equation.

$$D_t = D_o (1+g)^t$$

Where,

$D_t$  = dividend for year t

$D_o$  = dividend for current year

$g$  = constant compound growth rate

**Example : 11**

The current dividend for an equity share is Rs.3.00. If the constant compound growth rate is 6% what will be the dividend 5 years hence?

$$D_t = D_0 (1+g)^t$$

Given values,  $D_0 = 3$ ;  $g = .06$ ;  $t = 5$  years.

Putting the given values in the above formula you will get

$$D_5 = 3(1+.06)^5$$

Referring to compound value of Re. 1 table corresponding to 6% and 5 years period you will get.

$$= 3 (1.338)$$

$$= 4.014$$

Thus, the dividend 5 years hence is Rs. 4.01.

**Multiple Variable growth rate of dividends**

The multiple growth assumption has to be made in a vast number of practical situations. The infinite future time period is viewed as divisible into two or more different growth segments. The investor must forecast the time 'T' up to which growth would be variable and after which only the growth rate would show a pattern and would be constant. This would mean that the present value calculations will have to be spread over two phases.

One phase would last until time 'T' and the other would begin after 'T' to infinity. The present value of all dividends forecast upto and include 'T'  $V_{T(1)}$  would be

$$V_{T(1)} = \sum_{t=1}^T \frac{D_t}{(1+k)^t}$$

The second phase present value is denoted by  $V_{T(2)}$  and would be based on constant - growth dividends forecast after time 'T'. The present value of the second phase stream of dividends can, therefore, be estimated by using equation of constant growth assumption and at time 'T' :

$$V_T = \frac{D_1}{(k-g)}$$

You may note that ' $V_T$ ' given by the above equation is the present value at time 'T' of all future expected dividends. Hence, when this value has to be viewed at time 'zero' it must be discounted to provide the present value at 'zero' time for the second phase present value. The latter can also be viewed at time 'zero' as a series of cash dividends that grow at a constant rate as already stated. The resulting second phase value  $V_{T(2)}$  will be given by the following equation :

$$V_{T(2)} = V_T \left[ \frac{1}{(1+k)^T} \right] = \frac{D_{T+1}}{(k-g)(1+k)^T}$$

$$V_o = V_{T(1)} + V_{T(2)} = \sum_{t=1}^T \frac{D_t}{(1+k)^t} + \frac{D_{T+1}}{(k-g)(1+k)^T}$$

**Example : 12**

L & T Co. Ltd., paid a current dividend of Rs. 2.00 per share and the investors expecting that the dividends will grow at 20% per annum for the next four years and thereafter the dividends will grow at 5% per year into an indefinite future. If the investors required rate of return is 12% calculate the value of the share.

**Solution:**

The value of  $V_{T(1)}$  and  $V_{T(2)}$  can be calculated as follows :

$$V_{T(1)} = \frac{D_o(1+g)^1}{(1+k_e)^1} + \frac{D_o(1+g)^2}{(1+k_e)^2} + \frac{D_o(1+g)^3}{(1+k_e)^3} + \frac{D_o(1+g)^4}{(1+k_e)^4}$$

Given values,  $D_o = \text{Rs } 2.00$ ;  $g = .20$  or 20%;  $K_e = 12\%$  or .12

they putting these values in the above formula we will get.

$$V_{T(1)} = \frac{2.00(1+.20)^1}{(1+.12)^1} + \frac{2.00(1+.20)^2}{(1+.12)^2} + \frac{2.00(1+.20)^3}{(1+.12)^3} + \frac{2.00(1+.20)^4}{(1+.12)^4}$$

The present value factors corresponding to 12% for 1 to 4 years are .893; .797; .712 and .636.

$$= (2.40 \times .893) + (2.88 \times .797) + (3.456 \times .712) + (4.147 \times .636) = 2.14 + 2.30 + 2.45 + 2.64 = 9.54.$$

So, the value of  $V_{T(1)}$  is Rs 9.54.

$$V_{T(2)} = \frac{D_{T+1}}{(k-g)(1+k_e)^T}$$

as  $D_T = \text{Rs } 4.147$ ;  $g = .05$ ;  $k_e = .12$  and  $T = 4$

$$\text{The value of } V_{T(2)} = \frac{4.147(1+.05)}{(.12-.05)(1+.12)^4} = \frac{4.354}{.07 \times .636} = 39.56$$

Hence,

$$V_o = V_{T(1)} + V_{T(2)} = 9.54 + 39.56 = 49.10$$

Therefore, the value of the share is Rs. 49.10.

**Firm not paying dividends**

In some cases, a firm though makes profits, does not declare dividends such companies do command positive market prices for their shares, as today's price depends on the future expectation of dividends. Shareholders hold shares of such companies with a hope to realize capital gains in future. Thus, dividend capitalization model is used for those companies, which are presently not paying dividend.

$P_o = \text{Today's worth of a share} - \text{Present value of dividends not received}$

**Example : 13**

A Company is expected to pay dividend of Rs.2 per share from fifth year to infinity. If the required rate of return is 20%, calculate the value of the share.

**Solution:**

$$P_4 = \frac{2}{0.20} = \text{Rs. } 10$$

Hence, Rs. 10 may be considered as a lumpsum amount received at the end of fourth year. The worth of the share today will, therefore, be the discounted value of Rs. 10.

$$P_0 = \frac{10}{(1.2)^4} = 10 \times 0.482 = \text{Rs. } 4.82.$$

Present worth of the share = Today's worth of the share - Present value of dividends not received.

$$\begin{aligned} &= 10 - 2 \times \text{PVIFA } 20\% \text{ for 4 years} \\ &= 10 - 2 \times 2.589 \\ &= 4.822 \end{aligned}$$

Therefore,  $P_0 = \text{Rs. } 4.822$

**b) Earnings capitalisation approach**

The dividends capitalization approach, discussed above is the basic valuation model. In the following two cases, the value of a share is determined by capitalising the expected earnings:

- i) When the retention rate (b) is zero i.e. the firm pays out 100% dividends; (b=0)
- ii) When the Return on Equity (ROE) is equal to opportunity cost of capital ( $K_e$ ) i.e.  $\text{ROE} = K_e$

**1. When retention rate (b) is Zero :** the earnings will not grow, when the firm does not retain the earnings and also does not employ debt. When the retention rate (b) is equal to Zero, the growth rate (g) would also be equal to Zero and dividends would be equal to EPS.

The value of share is found out by using the following formula

$$P_0 = \frac{\text{EPS}_1 (1-b)}{(K_e - rb)}$$

Where,

b = retention rate; 1- b = Dividend payout Ratio.

If b = 0, then g = rb is equal to zero and then formula simply becomes

$$P_0 = \frac{\text{Div}_1}{K_e} = \frac{\text{EPS}_1}{K_e}$$

**Example : 14**

Calculate the price of a share if  $\text{EPS} = \text{Rs. } 2.50$ ;  $b = .4$ ,  $K_e = .10$  and  $\text{ROE} = r = .20$

What shall be the price if  $r = K_e = 0.10$ ?



**Solution**

$$P_o = \frac{EPS_1(1 - b)}{(K_e - rb)}$$

$$= \frac{2.50(1 - .4)}{.10 - (.20 \times .4)} = \frac{1.5}{0.02} = \text{Rs.75}$$

Thus, the price of a share is Rs.75

When  $r = 0.10$ , the price will be

$$P_o = \frac{2.50(1 - 0.4)}{0.10 - (0.10 \times .4)} = \frac{1.50}{0.10 - 0.04} = \frac{1.50}{0.06} = \text{Rs. 25.}$$

However, if  $r = K_e$ , the price can be determined as

$$P_o = \frac{EPS_1}{K_e}$$

In this illustration by using this formula we shall have the same answer as above.

**Rate of return on Equity shares :**

The required rate of return depends upon the riskiness of the share.

Required rate of return = the risk free rate of interest + the risk premium.

When the market is in an equilibrium position, the present value of a share is equal to the market value of a share and the required rate of return can be calculated by using the following formula :

$$P_o = \frac{Div_1}{(K_e - g)} \quad \text{or} \quad K_e = \frac{Div_1}{P_o} + g$$

If the current selling price, the expected price of a share and dividend at the end of the year are given the expected rate of return ( $r_e$ ) which can be calculated by using the following formula. Instead of calculating the present value or the fair price, we may be required to calculate the rate of return which an investor can expect if he purchases the share at the current market price. The expected rate of return on equity share is similar to the internal rate of return on an asset.

For example, if an investor will hold the share for one year only, the expected rate of return is the rate that equates the present value of the dividend at the end of the first year,  $DIV_1$  and the price of the share at the end of the first year  $P_1$  to the current share price,  $P_o$ .

$$\text{Expected rate of return } (r_e) = \frac{Div_1}{P_o} + \frac{(P_1 - P_o)}{P_o}$$

Where,  $P_1$  = Price of the share at the end of the first year,  $P_o$  = Current price of the share.

$DIV_1$  = dividend at the end of the first year.

**Example : 15**

A Company's share is currently being sold at Rs.50 per share. It is expected that a dividend of Rs.3 per share and a price of Rs.52 will be obtained at the end of one year. Calculate expected rate of return.

$$r_e = \frac{\text{Div}_1}{P_0} + \frac{(P_1 - P_0)}{P_0}$$

Given values, dividend =Rs. 3 ;  $P_0$  = Rs. 50;  $P_1$  = Rs. 52

Putting the given values in the above formula you will get

$$r_e = \frac{3}{50} + \frac{(52 - 50)}{50} = .06 + .04 = .10$$

Hence, the expected rate of return is 10%

**16.7 SUMMARY**

In this lesson, you have studied the various concepts of Value and the need for Valuation. You have also learnt the Bond and Share Valuation models, the valuation being based on the concept of present value. The present value of a bond or a share is equal to the discounted value of the stream of cash flows. In case of a bond/debenture, the stream of cash flows consists of annual interest payments and principal on maturity. Cash flows of a share consists of the stream of dividends and terminal price of the share. Out of the two approaches available for valuation of equity shares i.e. dividend capitalisation and earnings capitalisation, dividend capitalisation approach is the basic valuation model.

**16.8 SELF ASSESSMENT QUESTIONS**

1. Explain the meaning and various concepts of Value. Which is the most appropriate concept for making Financial Decisions?
2. Explain the two approaches for the valuation of equity shares with suitable examples.
3. a Rs.100 par value bond bearing a coupon rate of 12% will mature after 5 years. What is the value of the bond, if the discount rate is 15% (**Answer Rs.89.92**)
4. a Rs. 100 par value bears a coupon rate of 14% and matures after 5 years. Interest is payable semi-annually. Compute the value of the bond, if the required rate of return is 16% (**Answer Rs. 93.27**)
5. The market price of a Rs. 1000 par value bond carrying a coupon rate of 14% and maturing after 5 years is Rs.1050. What is the yield to maturity on this bond? (**Answer 12.68%**)
6. A Company issued some years ago irredeemable preference shares of Rs.100 each. The preference shares carried a dividend rate of 12%. The current expected dividend rate on such shares is 16%. You are required to compute the value of preference shares (**Answer Rs.75**).

7. A Company is expected to pay a dividend of Rs. 4 per share next year. The dividends are expected to grow perpetually at a rate of 8%. Find out the share price, if the market capitalises dividend at 12% (**Answer Rs. 100**).
8. A Company has a book value per share of Rs.137.80 . Its return on equity is 15% and it follows as policy of retaining 60% of its earnings. If the opportunity cost of capital is 18.5%, calculate the price of share.  
(**Answer : Rs. 91.89**)
9. A Company's expected dividend now is Rs. 3.48 per share. Its dividends are expected to grow at 15% for six years and then at a rate of 8% indefinitely. The capitlisation rate is 12%. Calculate the price of the share today.  
(**Ans. Rs. 132.93**).
10. A Company's current price of share is Rs.60 and the dividend per share is Rs.4. If its capitlisation rate is 12%, find out the dividend growth rate.  
(**Answer : 5%.**)

### 16.9 Keywords

**Book Value :** The accounting value, which is the networth of the firm divided by the number of outstanding shares.

**Market Value :** It is the current price at which an asset or the security can be bought or sold.

**Risk :** Deviation of actual return from that which was expected. It is measured by the standard deviation.

**Dividend yield :** Ratio of the current dividend to the current market price of a share.

**Networth :** Networth of a firm consisting of paid up equity capital plus reserves and surplus minus accumulated losses, if any.

### 16.10 FURTHER READING

- |                              |   |   |
|------------------------------|---|---|
| Pandey I.M.                  | : | “Financial Management”, Vikas Publishing House (P) Ltd. New Delhi         |
| Kulkarni P.V.                | : | “Financial Management”, Himalaya Publishing House, Bombay                 |
| Sharma & Shashi K.Gupta R.K. | : | “Financial Management”, Kalyani Publishers”. Ludhiana                     |
| James C.Van Horne            | : | “Financial Management & Policy, Prentice-Hall of India (P) Ltd. New Delhi |
| Khan & Jain                  | : | “Financial Management”, Tata McGraw Hill Publishing Co. Ltd., New Delhi   |
| Prasanna Chandra             | : | “Financial Management”, Tata McGraw Hill Publishing Co. Ltd., New Delhi.  |



## APPENDIX

*Table 1 : The Present Value of One Rupee*

Year	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1	.990	.980	.971	.962	.952	.943	.935	.926	.917	.909
2	.980	.961	.943	.925	.907	.890	.873	.857	.842	.826
3	.980	.942	.915	.889	.864	.840	.816	.794	.772	.751
4	.961	.924	.888	.855	.823	.792	.763	.735	.708	.683
5	.951	.906	.863	.822	.784	.747	.713	.681	.650	.621
6	.942	.888	.837	.790	.746	.705	.666	.630	.596	.564
7	.933	.871	.813	.760	.711	.665	.623	.583	.547	.513
8	.923	.853	.789	.731	.677	.627	.582	.540	.502	.467
9	.914	.837	.766	.703	.645	.592	.544	.500	.460	.424
10	.905	.820	.744	.676	.614	.558	.508	.463	.422	.386
11	.896	.804	.722	.650	.585	.527	.475	.429	.388	.350
12	.887	.789	.701	.625	.557	.497	.444	.397	.356	.319
13	.879	.773	.681	.601	.530	.469	.415	.368	.326	.290
14	.870	.758	.661	.577	.505	.442	.388	.340	.299	.263
15	.861	.743	.642	.555	.481	.417	.362	.315	.275	.239
16	.853	.728	.623	.534	.458	.394	.339	.292	.252	.218
17	.844	.714	.605	.513	.436	.371	.317	.270	.231	.198
18	.836	.700	.587	.494	.416	.350	.296	.250	.212	.180
19	.828	.686	.570	.475	.396	.331	.277	.232	.194	.164
20	.820	.673	.554	.456	.377	.312	.258	.215	.178	.149
21	.811	.660	.538	.439	.359	.294	.242	.199	.164	.135
22	.803	.647	.522	.433	.342	.278	.226	.184	.150	.123
23	.795	.634	.507	.406	.326	.262	.211	.170	.138	.112
24	.788	.622	.492	.390	.310	.247	.197	.158	.126	.102
25	.780	.610	.478	.375	.295	.233	.184	.146	.116	.092
30	.742	.552	.412	.308	.231	.174	.131	.099	.075	.057
35	.706	.500	.355	.253	.181	.130	.094	.068	.049	.036
40	.672	.453	.307	.208	.142	.097	.067	.046	.032	.045
45	.410	.264	.171	.111	.073	.043	.348	.031	.021	.014
50	.806	.372	.228	.141	.087	.054	.034	.021	.013	.009

*Table 1 : The Present Value of One Rupee*

Year	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
1	.901	.893	.885	.877	.870	.862	.855	.847	.840	.833
2	.812	.797	.783	.769	.756	.743	.731	.718	.706	.694
3	.731	.712	.693	.675	.658	.641	.624	.609	.593	.579
4	.659	.636	.613	.592	.572	.552	.534	.516	.499	.482

5	.593	.567	.543	.519	.497	.476	.456	.437	.419	.402
6	.535	.507	.480	.456	.432	.410	.390	.370	.352	.335
7	.482	.452	.425	.400	.376	.354	.333	.314	.296	.279
8	.434	.404	.376	.315	.327	.305	.285	.266	.249	.233
9	.391	.361	.333	.308	.284	.263	.243	.225	.209	.194
10	.352	.322	.295	.270	.247	.227	.208	.191	.176	.162
11	.317	.287	.261	.237	.215	.195	.178	.162	.148	.135
12	.286	.257	.231	.208	.187	.168	.152	.137	.124	.112
13	.258	.229	.204	.182	.163	.145	.130	.116	.104	.093
14	.232	.205	.181	.160	.141	.125	.111	.099	.088	.078
15	.209	.183	.160	.140	.123	.108	.095	.084	.074	.065
16	.188	.163	.141	.123	.107	.093	.081	.071	.062	.054
17	.170	.146	.125	.108	.093	.080	.069	.060	.052	.045
18	.153	.130	.111	.095	.081	.069	.059	.051	.044	.038
19	.138	.116	.098	.083	.070	.060	.051	.043	.037	.031
20	.124	.104	.087	.073	.061	.051	.043	.037	.031	.026
21	.112	.093	.077	.064	.053	.044	.037	.031	.026	.022
22	.101	.083	.068	.056	.046	.038	.032	.026	.022	.018
23	.091	.074	.060	.049	.040	.033	.027	.022	.018	.015
24	.082	.066	.053	.043	.035	.028	.023	.019	.015	.013
25	.074	.059	.047	.038	.030	.024	.020	.016	.013	.010
30	.044	.033	.026	.020	.015	.012	.009	.007	.005	.004
35	.026	.019	.014	.010	.008	.006	.004	.003	.002	.002
40	.015	.011	.008	.005	.004	.003	.002	.001	.001	.001
45	.009	.006	.004	.003	.002	.001	.001	.001	.000	.000
50	.005	.003	.002	.001	.001	.001	.000	.000	.000	.000

**Table 1 : The Present Value of One Rupee**

Year	21%	22%	23%	24%	25%	26%	27%	28%	29%	30%
1	.826	.820	.813	.806	.800	.794	.787	.781	.775	.769
2	.683	.672	.661	.650	.640	.630	.620	.610	.601	.592
3	.564	.551	.537	.524	.512	.500	.488	.477	.466	.455
4	.467	.451	.437	.423	.410	.397	.384	.373	.361	.350
5	.386	.370	.355	.341	.328	.315	.303	.291	.280	.269
6	.319	.303	.289	.275	.262	.250	.238	.227	.217	.207
7	.263	.249	.235	.222	.210	.198	.188	.178	.168	.159
8	.218	.204	.191	.179	.168	.157	.148	.139	.130	.123
9	.180	.167	.155	.144	.134	.125	.116	.118	.101	.094
10	.149	.137	.126	.116	.107	.099	.092	.085	.078	.073
11	.123	.112	.103	.094	.086	.079	.072	.066	.061	.056
12	.102	.092	.083	.076	.069	.062	.057	.052	.047	.043

13	.084	.075	.068	.061	.055	.050	.045	.040	.037	.033
14	.069	.062	.055	.049	.044	.039	.035	.032	.028	.025
15	.057	.051	.045	.040	.035	.031	.028	.025	.022	.020
16	.047	.042	.036	.032	.028	.025	.022	.019	.017	.015
17	.039	.034	.030	.026	.023	.020	.017	.015	.013	.012
18	.032	.028	.024	.021	.018	.016	.014	.012	.010	.009
19	.027	.023	.020	.017	.014	.012	.011	.009	.008	.007
20	.022	.019	.016	.014	.012	.010	.008	.007	.006	.005
21	.018	.015	.013	.011	.009	.008	.007	.006	.005	.004
22	.015	.013	.011	.009	.007	.006	.005	.004	.004	.003
23	.012	.010	.009	.007	.006	.005	.004	.003	.003	.002
24	.010	.008	.007	.006	.005	.004	.003	.003	.002	.002
25	.009	.007	.006	.005	.004	.003	.003	.002	.002	.001
30	.003	.003	.002	.002	.001	.001	.001	.001	.000	.000
35	.001	.001	.001	.001	.000	.000	.000	.000	.000	.000
40	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
45	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
50	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

**Table 1 : The Present Value of One Rupee**

<b>Year</b>	<b>31%</b>	<b>32%</b>	<b>33%</b>	<b>34%</b>	<b>35%</b>	<b>36%</b>	<b>37%</b>	<b>38%</b>	<b>39%</b>	<b>40%</b>
1	.763	.758	.752	.746	.741	.735	.7300	.725	.719	.714
2	.583	.574	.565	.557	.549	.541	.533	.525	.518	.510
3	.445	.435	.425	.416	.406	.398	.389	.318	.372	.364
4	.340	.329	.320	.310	.301	.292	.284	.276	.268	.260
5	.259	.250	.240	.231	.223	.215	.207	.200	.193	.186
6	.198	.189	.181	.173	.165	.158	.151	.145	.139	.133
7	.151	.143	.136	.129	.122	.116	.110	.105	.100	.095
8	.115	.108	.102	.096	.091	.085	.081	.076	.072	.068
9	.088	.082	.077	.072	.067	.063	.059	.055	.052	.048
10	.067	.062	.058	.054	.050	.046	.043	.040	.037	.035
11	.051	.047	.043	.040	.037	.034	.031	.029	.027	.025
12	.039	.036	.033	.030	.027	.025	.023	.021	.019	.018
13	.030	.027	.025	.022	.020	.018	.017	.015	.014	.013
14	.023	.021	.018	.017	.015	.014	.012	.011	.010	.009
15	.017	.016	.014	.012	.011	.010	.009	.008	.007	.006
16	.013	.012	.010	.009	.008	.007	.006	.006	.005	.005
17	.010	.009	.008	.007	.006	.005	.005	.004	.004	.003
18	.008	.007	.006	.005	.004	.003	.003	.003	.003	.002
19	.006	.005	.004	.004	.003	.003	.003	.002	.002	.002
20	.005	.004	.003	.003	.002	.002	.002	.002	.001	.001
21	.003	.003	.003	.002	.002	.002	.001	.001	.001	.001



22	.003	.002	.002	.002	.001	.001	.001	.001	.001	.001
23	.002	.002	.001	.001	.001	.001	.001	.001	.001	.000
24	.002	.001	.001	.001	.001	.001	.001	.000	.000	.000
25	.001	.001	.001	.001	.001	.001	.000	.000	.000	.000
30	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
35	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
40	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
45	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
50	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

**Table 2 : The Present Value of an Annuity of Re.1**

Year	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1	.990	.980	.971	.962	.952	.943	.935	.926	.917	.909
2	1.970	1.942	1.913	1.886	1.859	1.833	1.808	1.783	1.759	1.736
3	2.941	2.884	2.829	2.775	2.723	2.673	2.624	2.577	2.531	2.487
4	3.902	3.808	3.717	3.630	3.546	3.465	3.387	3.312	3.240	3.170
5	4.853	4.713	4.580	4.452	4.329	4.212	4.100	3.993	3.890	3.791
6	5.795	5.601	5.417	5.242	5.076	4.917	4.767	4.623	4.486	4.355
7	6.728	6.472	6.230	6.002	5.786	5.582	5.389	5.206	5.033	4.868
8	7.652	7.326	7.020	6.733	6.463	6.210	5.917	5.747	5.535	5.335
9	8.566	8.162	7.786	7.435	7.108	6.802	6.515	6.247	5.995	5.759
10	9.471	8.983	8.530	8.111	7.722	7.360	7.024	6.710	6.418	6.145
11	10.368	9.787	9.253	8.760	8.306	7.887	7.499	7.139	6.805	6.495
12	11.255	10.575	9.954	9.385	8.863	8.384	7.943	7.536	7.161	6.814
13	12.134	11.348	10.635	9.986	9.394	8.853	8.358	7.904	7.487	7.103
14	13.004	12.106	11.296	10.563	9.899	9.295	8.748	8.244	7.786	7.367
15	13.865	12.849	11.938	11.118	10.380	9.712	9.108	8.560	8.061	7.606
16	14.718	13.578	12.561	11.652	10.838	10.106	9.447	8.851	8.313	7.824
17	15.562	14.292	13.166	12.166	11.274	10.477	9.763	9.122	8.544	8.022
18	16.398	14.992	13.754	12.659	11.690	10.828	10.059	9.372	8.756	8.022
19	17.226	15.679	14.324	13.134	12.085	11.158	10.336	9.604	8.950	8.365
20	18.046	16.352	14.878	13.590	12.462	11.470	10.594	9.818	9.129	8.514
21	18.857	17.011	15.415	14.029	12.821	11.764	10.836	10.017	9.292	8.649
22	19.661	17.658	15.937	14.451	13.163	12.042	11.061	10.201	9.442	8.772
23	20.456	18.292	16.444	14.857	13.489	12.303	11.272	10.371	9.580	8.883
24	21.244	18.914	16.936	15.247	13.799	12.550	11.469	10.529	9.707	8.985
25	22.023	19.524	17.413	15.622	14.094	12.783	11.654	10.675	9.823	9.077
30	25.808	22.397	19.601	17.292	15.373	13.765	12.409	11.258	10.274	9.427
35	29.409	24.999	21.487	18.665	16.374	14.498	12.948	11.655	10.567	9.644
40	32.835	27.356	23.115	19.793	17.159	15.046	12.332	11.925	10.757	9.779
45	36.095	29.490	24.519	20.720	17.774	15.456	13.606	12.108	10.881	9.863
50	39.197	31.424	25.730	21.482	18.256	15.762	13.801	12.234	10.962	9.915

**Table 2 : The Present Value of an Annuity of Re.1**

Year	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
1	.901	.893	.885	.877	.870	.862	.855	.847	.850	.833
2	1.713	1.690	1.668	1.647	1.626	1.605	1.585	1.566	1.547	1.528
3	2.444	2.402	2.361	2.322	2.283	2.246	2.210	2.174	2.140	2.106
4	3.102	3.037	2.974	2.914	2.855	2.798	2.743	2.690	2.639	2.589
5	3.696	3.605	3.517	3.433	3.352	3.274	3.199	3.127	3.058	2.991
6	4.231	4.111	3.998	3.889	3.784	3.685	3.589	3.498	3.410	3.326
7	4.712	4.564	4.423	4.288	4.160	4.039	3.922	3.812	3.706	3.605
8	5.146	4.968	4.799	4.639	4.487	4.344	4.207	4.078	3.954	3.837
9	5.537	5.328	5.132	4.946	4.772	4.607	4.451	4.303	4.163	4.031
10	5.889	5.650	5.426	5.216	5.019	4.833	4.659	4.494	4.339	4.192
11	6.207	5.938	5.687	5.453	5.234	5.029	4.836	4.656	4.487	4.327
12	6.492	6.194	5.918	5.660	5.421	5.197	4.988	4.793	4.611	4.439
13	6.750	6.424	6.122	5.842	5.583	5.342	5.118	4.910	4.715	4.533
14	6.982	6.628	6.303	6.002	5.724	5.468	5.229	5.008	4.802	4.611
15	7.191	6.811	6.462	6.142	5.847	5.575	5.324	5.092	4.876	4.675
16	7.379	6.974	6.604	6.265	5.954	5.669	5.405	5.162	4.938	4.730
17	7.549	7.120	6.729	6.373	6.047	5.749	5.475	5.222	4.990	4.775
18	7.702	7.250	6.840	6.467	6.128	5.818	5.534	5.273	5.033	4.812
19	7.839	7.366	6.938	6.550	6.198	5.877	5.585	5.316	5.070	4.843
20	7.963	7.469	7.025	6.623	6.259	5.929	5.628	5.353	5.101	4.870
21	8.075	7.562	7.102	6.687	6.312	5.973	5.665	5.384	5.127	4.891
22	8.176	7.645	7.170	6.743	6.359	6.011	5.696	5.410	5.149	4.909
23	8.266	7.718	7.230	6.792	6.399	6.044	5.723	5.432	5.167	4.925
24	8.348	7.784	7.283	6.835	6.434	6.073	5.747	5.451	5.182	4.937
25	8.422	7.843	7.330	6.873	6.464	6.097	5.766	5.467	5.195	4.948
30	8.694	8.055	7.496	7.003	6.566	6.177	5.829	5.517	5.235	4.979
35	8.855	8.176	7.586	7.070	6.617	6.215	5.858	5.539	5.251	4.992
40	8.951	8.244	7.634	7.105	6.642	6.233	5.871	5.548	5.258	4.997
45	9.008	8.283	7.661	7.123	6.654	6.242	5.877	5.552	5.261	4.999
50	9.042	8.305	7.675	7.133	6.661	6.246	5.880	5.554	5.262	4.999

**Table 2 : The Present Value of an Annuity of Re.1**

Year	21%	22%	23%	24%	25%	26%	27%	28%	29%	30%
1	.826	.820	.813	.806	.800	.794	.787	.781	.775	.769
2	1.509	1.492	1.474	1.457	1.440	1.424	1.407	1.392	1.376	1.361
3	2.074	2.042	2.011	1.981	1.952	1.923	1.896	1.868	1.842	1.816
4	2.540	2.49	2.448	2.404	2.362	2.320	2.280	2.241	2.203	2.166
5	2.926	2.864	2.803	2.745	2.689	2.635	2.58	2.532	2.483	2.436

6	3.245	3.167	3.092	3.020	2.951	2.885	2.821	2.759	2.700	2.643
7	3.508	3.416	3.327	3.242	3.161	3.083	3.009	2.937	2.868	2.802
8	3.726	3.619	3.518	3.421	3.329	3.214	3.156	3.076	2.999	2.925
9	3.905	3.786	3.673	3.566	3.463	3.366	3.273	3.184	3.100	3.019
10	4.054	3.923	3.799	3.682	3.570	3.465	3.364	3.269	3.178	3.092
11	4.177	4.035	3.902	3.776	3.656	3.544	3.437	3.335	3.239	3.147
12	4.278	4.127	3.985	3.851	3.725	3.606	3.493	3.387	3.286	3.190
13	4.362	4.203	4.053	3.912	3.780	3.656	3.538	3.427	3.322	3.223
14	4.432	4.265	4.108	3.962	3.824	3.695	3.573	3.459	3.351	3.249
15	4.489	4.315	4.153	4.001	3.859	3.726	3.601	3.483	3.373	3.268
16	4.536	4.357	4.189	4.033	3.887	3.751	3.623	3.503	3.390	3.283
17	4.576	4.391	4.219	4.059	3.910	3.771	3.640	3.518	3.403	3.295
18	4.608	4.419	4.243	4.080	3.928	3.786	3.654	3.529	3.413	3.303
19	4.635	4.442	4.263	4.097	3.942	3.799	3.664	3.539	3.421	3.311
20	4.657	4.460	4.279	4.110	3.954	3.808	3.673	3.546	3.427	3.316
21	4.675	4.476	4.292	4.121	3.963	3.816	3.679	3.551	3.432	3.320
22	4.690	4.488	4.302	4.130	3.970	3.822	3.684	3.556	3.436	3.323
23	4.703	4.499	4.311	4.137	3.976	3.827	3.689	3.559	3.438	3.325
24	4.713	4.507	4.318	4.143	3.981	3.831	3.692	3.565	3.441	3.327
25	4.721	4.514	4.323	4.147	3.985	3.854	3.694	3.564	3.442	3.329
30	4.746	4.534	4.339	4.160	3.995	3.42	3.701	3.569	3.447	3.332
35	4.756	4.541	4.345	4.164	3.998	3.845	3.703	3.571	3.448	3.333
40	4.760	4.544	4.347	4.166	3.999	3.846	3.703	3.571	3.448	3.333
45	4.761	4.545	4.347	4.166	4.000	3.846	3.704	3.571	3.448	3.333
50	4.762	4.545	4.348	4.167	4.000	3.806	3.704	3.571	3.448	3.333

**Table 2 : The Present Value of an Annuity of Re.1**

<b>Year</b>	<b>31%</b>	<b>32%</b>	<b>33%</b>	<b>34%</b>	<b>35%</b>	<b>36%</b>	<b>37%</b>	<b>38%</b>	<b>39%</b>	<b>40%</b>
1	.763	.758	.752	.746	.741	.735	.730	.725	.719	.714
2	1.346	1.331	1.317	1.303	1.289	1.276	1.263	1.250	1.237	1.224
3	1.791	1.766	1.742	1.719	1.696	1.673	1.652	1.630	1.609	1.589
4	2.130	2.096	2.062	2.029	1.997	1.966	1.935	1.906	1.877	1.849
5	2.390	2.345	2.302	2.260	2.220	2.181	2.143	2.106	2.070	2.035
6	2.588	2.534	2.483	2.433	2.385	2.339	2.294	2.251	2.209	2.168
7	2.739	2.677	2.619	2.562	2.508	2.455	2.404	2.355	2.308	2.263
8	2.854	2.786	2.721	2.656	2.598	2.540	2.485	2.432	2.380	2.331
9	2.942	2.868	2.798	2.730	2.665	2.603	2.544	2.487	2.432	2.379
10	3.009	2.930	2.885	2.784	2.715	2.649	2.587	2.527	2.469	2.414
11	3.060	2.978	2.899	2.824	2.752	2.683	2.618	2.555	2.496	2.438
12	3.100	3.013	2.931	2.853	2.779	2.708	2.641	2.576	2.515	2.456
13	3.129	3.040	2.956	2.876	2.799	2.727	2.658	2.592	2.529	2.469
14	3.152	3.061	2.974	2.892	2.814	2.740	2.670	2.603	2.539	2.477

15	3.170	3.076	2.988	2.905	2.825	2.750	2.679	2.611	2.546	2.484
16	3.183	3.088	2.999	2.914	2.834	2.757	2.685	2.616	2.551	2.489
17	3.193	3.097	3.007	2.921	2.840	2.763	2.690	2.621	2.555	2.492
18	3.210	3.104	3.012	2.926	2.844	2.767	2.693	2.624	2.557	2.494
19	3.207	3.109	3.017	2.930	2.848	2.770	2.696	2.626	2.559	2.496
20	3.211	3.113	3.020	2.933	2.850	2.772	2.698	2.627	2.561	2.497
21	3.215	3.116	3.023	2.935	2.852	2.773	2.699	2.629	2.562	2.498
22	3.217	3.118	3.025	2.936	2.853	2.775	2.700	2.629	2.562	2.498
23	3.219	3.120	3.026	2.938	2.854	2.775	2.701	2.630	2.563	2.499
24	3.221	3.121	3.027	2.939	2.855	2.776	2.701	2.630	2.563	2.499
25	3.222	3.122	3.028	2.939	2.856	2.776	2.702	2.631	2.563	2.499
30	3.225	3.124	3.030	2.941	2.857	2.777	2.702	2.631	2.563	2.499
35	3.226	3.125	3.030	2.941	2.857	2.777	2.702	2.631	2.564	2.500
40	3.226	3.125	3.030	2.941	2.857	2.778	2.703	2.632	2.564	2.500
45	3.226	3.125	3.030	2.941	2.857	2.778	2.703	2.632	2.564	2.500
50	3.226	3.125	3.030	2.941	2.857	2.778	2.703	2.632	2.564	2.500

### Syllabus

M.Sc., Zoology

#### Unit - 1

Vegetation types and plant distribution in the past and present. A comparison of pre Darwinian and post-Darwinian systems of classification.

#### Unit - II

Systematic of Angiosperms : Principles of plant taxonomy and nomenclature. Criteria of classification and evaluation of taxonomic categories. Contribution of anatomy, cytology, phytochemistry and geography to taxonomy.

#### Unit - III

Plant Ecology : Ecosystem concept, food chains and energy flow. Biological magnification, homeostasis