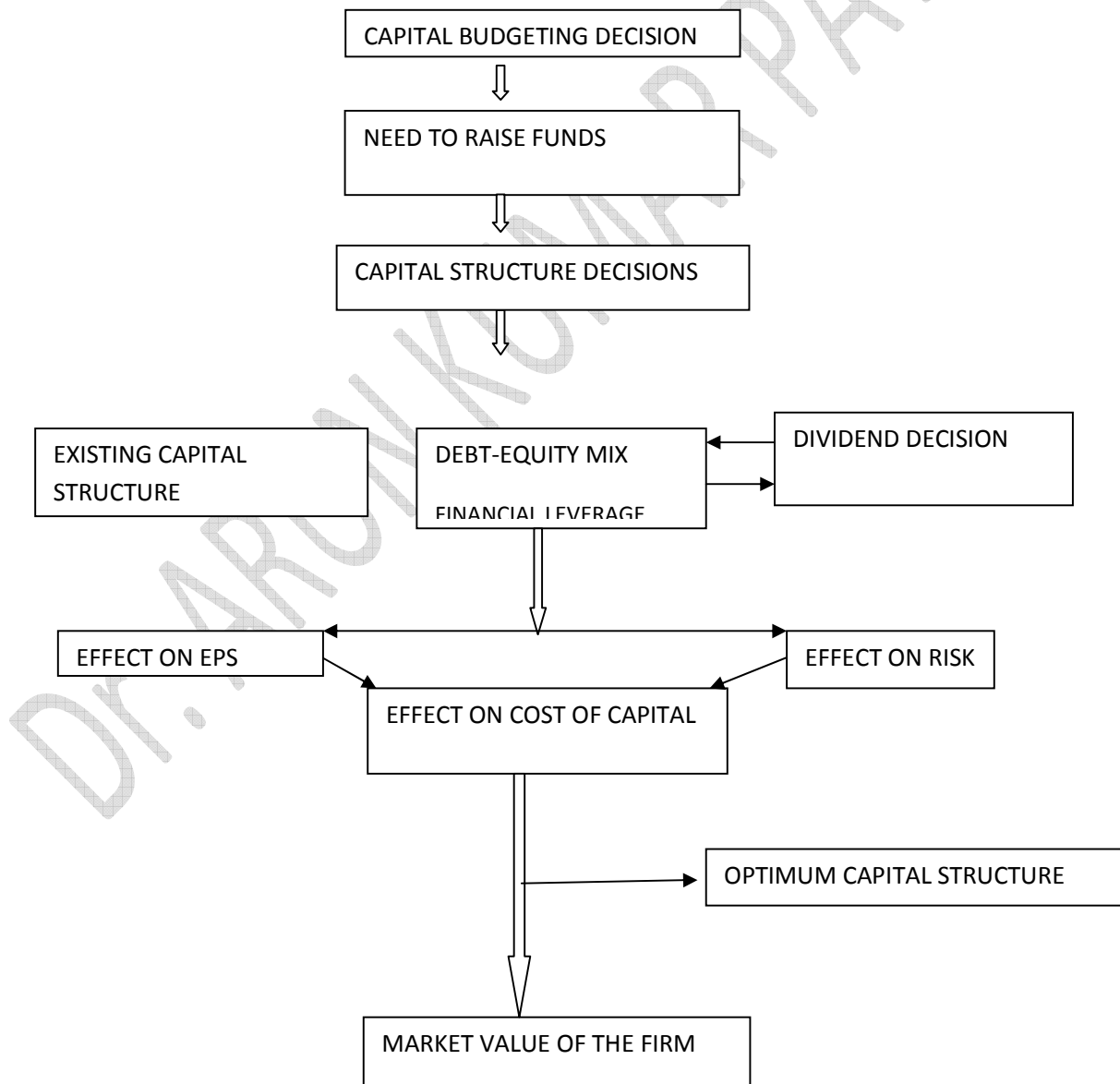


KATWA COLLEGE
DEPARTMENT OF COMMERCE
B.Com (Hons.) Sem VI

Study Materials on Management Accounting (Capital Structure and Financial Leverage)

The term capital structure is used to represent the proportionate relationship between the various forms of financing, such as debentures, long-term debt, preference capital and common share capital including reserves and surplus (viz.-retained earnings.)

The new financing decisions of the company may affect its debt-equity mix. The debt-equity mix has its implications for the shareholders' earnings and risk which in turn, affect the cost of capital and the market value of the firm.



CONCEPT OF CAPITAL STRUCTURE

The term 'Capital structure' implies the combination of sources which have been used for the creation of pool of funds. The sources of finance can be divided into two categories:

- i) **External Equity:** debentures, long term loans, advances, public deposits, preference share capital etc.
- ii) **Internal equity:** Equity share capital, retained earnings etc.

CAPITAL STRUCTURE VS. FINANCIAL STRUCTURE

The capital structure is related to long term capital (equity capital, preference share capital and long-term debt) while financial structure is related to both long-term and short-term capital (current liabilities) only.

IMPORTANCE OF CAPITAL STRUCTURE

The capital structure decisions to move towards achievement of wealth maximization and cost minimization (optimum capital structure). Therefore, it is very much important for the following reasons:

- i) **Minimization of cost:** One of the major objectives of the business is to raise its capital at the lowest possible cost. Minimization of cost of capital facilitates maximization of return to the owners.
- ii) **Maximization of return:** proper combination of capital structure facilitates the management to maximize its return to the equity shareholders.
- iii) **Minimization of risk:** There are two risks one is business risk another is financial risk. Business risk is independent of capital structure and is associated with investment decision or assets-mix whereas financial risk is dependent of capital structure and is associated with financing decision or capital -mix of the firm. For minimizing the risk associated with the business proper designing of capital structure is very much essential.
- iv) **Maintaining control:** The Company should design a capital structure by maintaining a proper balance between external equity and internal equity in order to prevent the dilution of control over its affairs. Internal equity holders always try to hold control over the affairs of the business.
- v) **Maximizing the value of the firm:** It is not possible for the firm to maximize the value of the firm without proper designing of its capital structure.

OPTIMAL CAPITAL STRUCTURE

The term 'optimal capital structure' implies that combination of external equity and internal equity at which the overall cost of capital is minimized and the market value of the firm or the shareholders' wealth is maximized.

FINANCIAL LEVERAGE/TRADING ON EQUITY

Financial leverage or Trading on equity is described as the use of fixed charges sources of funds, such as debt and preference capital along with the owners' equity in the capital structure.

Trading on equity is the process of magnifying rate of return by utilizing external sources of capital in the capital structure. This can be expressed by the following formula:

$$TOE = \frac{\text{ROE under the existing capital structure}}{\text{ROE under all equity capital structure}}$$

DETERMINANTS OF CAPITAL STRUCTURE

The following factors are to be considered while designing capital structure:

- i) **Business Risk:** the company having high business risk should maintain low financial risk by maintaining low debt-equity ratio in order to keep its total risk within a reasonable risk.
- ii) **Product diversification:** The company having a well diversified product range can reduce its risk to a greater extent. Thus, multi-product companies can maintain higher proportion of debt in their capital structure as compared to any single product firm.
- iii) **Nature of security offered:** The possibility of getting long term debt by a company largely depends on the nature of security (generally stable and tangible assets) offered by it. Thus the nature of the security offered by the borrowing company definitely influences its debt- equity ratio.
- iv) **Profitability:** When the rate of return is higher than rate of interest on debt capital, it is better for the firm to use more debt capital in its capital structure for the enjoying the benefits of Trading on Equity. So, profitability is the major consideration in designing its capital structure.
- v) **Control:** If funds are raised through a new public issue of equity capital the existing shareholders will have to share control with the new shareholders. Generally existing shareholders may not agree on this issue. If the shareholders are adverse to dilution of control, the company may rely on more debt capital. Thus, at the time of designing capital structure this factor is also taken into consideration.
- vi) **Timing:** If at the time of raising funds the conditions of the stock market are not favourable to issue equity share, the company may rely on borrowings. So, the timing aspect is very important while designing capital structure.

vii) **Institutional norms:** Different governmental and regulatory agencies impose certain norms in term of capital structure of the company.

viii) **Industry policies:** Generally, a company has to follow the pattern of capital structure adopted by other companies belonging to the same industry.

ix) **Cost of financing:** The cost of financing has an important influence on the choice of securities as the funds can be collected at varying cost through different kinds of securities. In raising capital, a company must consider the lowest cost. So, while formulating capital structure, the company should make the combination of different sources of funds at which its weighted average cost of capital in minimized.

x) **Flexibility:** A company can substitute one form of finance with other in order to reduce its overall cost of capital. Debt capital can be replaced by equity or other debt at any time but reverse cannot be possible. So, for ensuring greater flexibility, the company may put more emphasis on debt capital in designing its capital structure.

BUSINESS RISK: Business risk is associated with the investment decision or assets-mix of the firm. It can be defined as the variability in returns of assets. Such variability is the result of the environment-internal and external, in which the firm has to operate. Business risk is an unavoidable risk.

FINANCIAL RISK: Financial risk is associated with financing decision or capital - mix of the firm. A totally equity financed firm will have no financial risk. But when debt is used in capital structure of the firm, financial risk is added. It is an avoidable risk if the firm decides not to use debt in its capital structure.

BUSINESS RISK VS. FINANCIAL RISK:

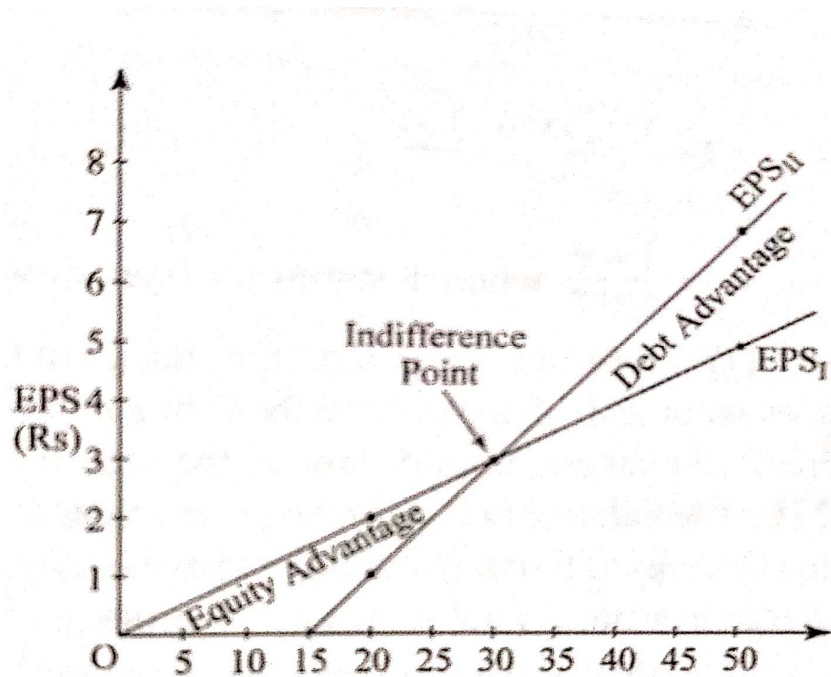
There are certain differences between business risk and financial risk. These are as follows:

- i) Business risk is associated with the operation of the business firm whereas financial risk is associated with the financing decision of the firm.
- ii) Business risk arises out of fluctuation in the rate of return on total fund invested. But financial risk arises out of the possibility of failing to meet contractual obligations.
- iii) Business risk is influenced by the cost structure of the firm as well as investment policy adopted by it. But financial risk is influenced by the capital structure of the firm.
- iv) Business risk is an unavoidable risk where as financial risk is an avoidable risk.

EBIT-EPS ANALYSIS: INDEFERENCE POINT:

Whether a firm can procure its entire amount of funds in the form of equity share or preference share or debt or by a combination of these three? EBIT-EPS Analysis examines the effect of financial leverage on the behaviour of EPS under different financing alternatives and with varying levels EBIT. If the EBIT-EPS Analysis is used for making the choice of combination of the various sources, the alternative that yield highest EPS should be selected as most profitable financing plan.

The EBIT level at which the EPS is the same for two alternative financing plan is known as the indifference point. At this point two alternative financing plans are equally desirable and the finance manager will be indifferent between alternative financing plans as far as the EPS is concerned. If the expected level of EBIT is greater than the indifference point, the use of the fixed charge bearing capital in the capital structure should be advantageous from the view point EPS. On the other hand, if the expected level of EBIT is lower than the indifference point, the use of equity in capital structure would be advantageous from the view point of EPS. Graphically this can be expressed as follows:



Let us now prepare a graph for determining indifference point using EBIT-EPS Analysis. In the diagram, the horizontal axis measures EBIT and the vertical axis measures EPS. The two lines EPS_I and EPS_{II} intersect at the EBIT level Rs, 30,000. Therefore, the EBIT level of Rs. 30,000 is the indifference point. If the level of EBIT exceeds Rs, 30,000, the indifference point, the use of debt financing is more advantageous and at any level of EBIT below Rs. 30,000, the use of equity financing would be advantageous from view point of EPS.

DOL (DEGREE OF OPERATING LEVERAGE)

Operating leverage may be defined as the firm's ability to use fixed operating cost to magnify the effects of changes of sales volume on its earnings before interest and taxes. In other words, it shows the sensitivity of EBIT to changes in sales volume. The higher the proportion of fixed operating costs to total operating costs, the higher is the degree of operating leverage and vice versa.

This can be expressed by the following formula:

$$DOL = \frac{\text{Proportionate change in EBIT}}{\text{Proportionate change in sales volume}}$$

$$= \frac{\text{Contribution}}{EBIT} = \frac{Q(s-v)}{EBIT} = \frac{EBIT + F}{EBIT} = 1 + \frac{F}{EBIT}$$

Notations are as usual;

The value of DOL must be greater than 1. If the value of DOL is equal to 1, then there is no operating leverage. In other words, if there is no fixed operating cost in the capital structure of the firm, then value of DOL is equal to 1.

USES OF OPERATING LEVERAGE:

DOL has two following uses:

- i) DOL measures the degree of business risk associated with the firm. The higher the value of DOL, the greater is the degree of business risk and vice versa.
- ii) DOL can also be used to ascertain the margin of safety ratio. There is a reciprocal relationship between DOL and margin of safety.

CONCEPT OF FINANCIAL LEVERAGE:

Financial leverage may be defined as the firm's ability to use fixed financial charges to magnify the effects of changes in EBIT on EPS (Earnings per share). The higher the proportion of fixed charges bearing capital to total capital employed by a firm, the higher is the degree of financial leverage and vice versa. The formula for calculating financial leverage is as follow:

$$DFL = \frac{\text{Proportionate change in EPS}}{\text{Proportionate change in EBIT}}$$

$$DFL = \frac{EBIT}{(EBIT - I) - \frac{D_p}{(1-t)}}$$

(Notations are as usual)

Where there is no preference capital in the capital structure of the firm, the DFL formula reduces to

$$DFL = \frac{EBIT}{EBT} \text{ as } D_0 \text{ will become zero.}$$

The value of DFL must be greater than 1. If the value of DFL is equal to 1, there is no financial leverage.

USES OF FINANCIAL LEVERAGE:

DFL has the following uses:

- i) DFL measures the degree of financial risk associated with the firm. The higher the value of DFL, the higher is the degree of financial risk and vice versa.
- ii) DFL can also be used to ascertain the financial margin of safety ratio. There is a reciprocal relationship between DFL and financial margin of safety.

$$\text{Financial Break-Even Point} = I + \frac{Dp}{(1-t)}$$

$$\text{Financial Margin of safety} = \frac{1}{DFL}$$

DEGREE OF DTL/DCL (DEGREE OF TOTAL/COMBINED LEVERAGE)

Total/combined leverage is the multiplicative form of DFL and DOL. It refers to the extent by which a firm has fixed operating costs as well as fixed financial charges. The degree of total/combined leverage is given by the following equation:

$$\text{DCL/DFL} = \frac{\text{Proportionate change in EBIT}}{\text{Proportionate change in sales volume}} \times \frac{\text{Proportionate change in EPS}}{\text{Proportionate change in EBIT}}$$

$$= \frac{\text{Proportionate change in EPS}}{\text{Proportionate change in sales volume}}$$

$$\text{DTL} = \frac{\text{Contribution}}{\text{EBIT}}$$

$$= \frac{\text{EBIT} + \text{Fixed cost}}{\text{EBT}} \quad (\text{Contribution} = \text{EBIT} + \text{Fixed cost})$$

$$= \frac{\text{EBT} + I + \text{Fixed cost}}{\text{EBT}}$$

$$= 1 + \frac{I + F}{\text{EBT}}$$

Concept of DOL, DFL and DCL Can is illustrated by the following example:

Calculate the degree of operating leverage and financial leverage under situations A, B, and C and financing plans 1, 2, and 3 respectively from the following information of ABC Ltd. What are the combination of operating leverage and financial leverage which give the highest value and lowest value? How is this information useful to the finance manager of ABC Ltd.?

| | |
|-------------------------|------------|
| Production and sales | 8000 units |
| Selling price per unit | Rs. 15 |
| Variable cost per unit | Rs. 10 |
| Fixed cost (operating): | |
| Situation A | Rs.2,000 |
| Situation B | Rs.1,000 |
| Situation C | Rs.3,000 |

| Capital structure | Plan | | |
|-------------------|--------|--------|--------|
| | 1 | 2 | 3 |
| | Rs. | Rs. | Rs. |
| Equity | 7,500 | 5,000 | 2,500 |
| Debt(12%) | 2,500 | 5,000 | 7,500 |
| Total | 10,000 | 10,000 | 10,000 |

Computation of Degree Operating leverage (DOL)

| Particulars | Situations | | |
|---|------------|--------|--------|
| | A | B | C |
| | Rs. | Rs. | Rs. |
| Sale volume (S) $8,000 \times 15$ | 12,000 | 12,000 | 12,000 |
| Less: Variable cost (V) $8,000 \times 10$ | 8,000 | 8,000 | 8,000 |
| Contribution (C) | 4,000 | 4,000 | 4,000 |
| Less: Fixed Operating cost (F) | 2,000 | 1,000 | 3,000 |
| EBIT | 2,000 | 3,000 | 1,000 |
| DOL (C/EBIT) | 2 | 1.33 | 4 |

Computation of degree of Financial Leverage under three situations for three alternative financial plans

| Particulars | Situation 1 | | | Situation 2 | | | Situation 3 | | |
|--------------------|-------------|-------|-------|-------------|-------|-------|-------------|-------|-------|
| | A | B | C | A | B | C | A | B | C |
| | Rs. | Rs. | Rs. | Rs. | Rs. | Rs. | Rs. | Rs. | Rs. |
| EBIT | 2,000 | 3,000 | 1,000 | 2,000 | 3,000 | 1,000 | 2,000 | 3,000 | 1,000 |
| Less: Interest (I) | 300 | 300 | 300 | 600 | 600 | 600 | 900 | 900 | 900 |
| EBT | 1,700 | 2,700 | 700 | 1,400 | 2,400 | 400 | 1,100 | 2,100 | 100 |
| DFL (EBIT/EBT) | 1.18 | 1.11 | 1.43 | 1.43 | 1.25 | 2.50 | 1.82 | 1.43 | 10.00 |

Computation of Degree of Combined (Total) Leverage $DCL = DOL \times DFL$

| Particulars | Financing Plans | | |
|--------------|-----------------|-------|-------|
| | 1 | 2 | 3 |
| Situations A | 2.36 | 2.86 | 3.64 |
| Situations B | 1.48 | 1.66 | 1.90 |
| Situations C | 5.72 | 10.00 | 40.00 |

As DOL measures degree of Business Risk and DFL measures the degree of Financial Risk associated with the company. From view point of business risk, C is the most risky situation while B is the least risky situation. From the view point of financial risk, financing plan 3 under situation C is the most risky while financing plan under situation B is the least risky. In terms of total risk profile of the company, financing plan under situation C is the most risky and financing plan 1 under situation B is the least risky.

Theories of capital structure

There are four theories of capital structure, these are:

i) Net Income (NI) Approach.

ii) Net Operating Income (NOI) Approach.

iii) Traditional Approach.

iv) Modigliani-Miller Approach.

Before starting discussion these theories, let us consider some common assumptions.

- I) A firm has two sources of capital viz.-equity capital and debt capital.
- II) The firm follows 100% dividend payout policy.
- III) There is no corporate tax.
- iv) The debt equity ratio can be changed either by issuing debt or by issuing shares to pay off debt.
- v) The firm's assets remain unchanged and thus, EBIT is not expected to grow.
- vi) Business risk associated with the firm remains constant and is independent of capital structure and financial structure.
- vii) The firm has perpetual life.

Usual notations:

B= Market value of debt; S= Market value of equity; V=B+S; O= Operating Income; I = Fixed Interest Charges; E=O-I= Net Income available to equity share holders; $K_d = \frac{I}{B}$ Cost of Debt; $K_e = \frac{E}{S}$ Cost of equity; $K_o = \frac{O}{V}$ overall Cost of Capital.

Fundamental relationship among K_o , K_d and K_e :

Two fundamental relationships which are relevant to the derivation of NI Approach and NOI Approach are as follows

- i) Cost of capital to the firm implies the weighted average of cost of debt and cost of equity. Thus,

$$K_o = K_d \frac{B}{V} + K_e \frac{S}{V}$$

- ii) Cost of equity is equal to cost capital plus a premium related to the financial risk. Thus,

$$K_e = K_o + (K_o - K_d) \frac{B}{S}$$

The expression $(K_o - K_d) \frac{B}{S}$ can be taken as the premium related to the financial risk. The ratio $\frac{B}{S}$ is an indicator of financial risk of the firm.

NET INCOME (NI) APPROACH:

This theory is proposed by David Durand in 1959. According to this approach, the firm is able to increase its value (V) and lower its overall cost of capital (K_o) if it increases the debt equity ratio. In other words, if the firm's degree of financial leverage increases, the overall cost of capital of the firm will decline and the value of the firm as well as market price of equity shares will go up.

This approach is based on the following assumptions:

- i) Cost of debt is lower than cost of equity (i.e. $K_d < K_e$).
- ii) The use of debt in the capital structure of the firm does not change the risk perception of the investor and therefore, cost of debt and cost of equity remain constant irrespective of financial leverage.
- iii) There are no taxes.

The implication of the assumptions underlying the NI approach is that the firm can lower its overall cost of capital continuously by increasing the proportion of cheaper debt capital in its capital structure. The optimal capital structure is one at which the overall cost of capital is lowest and the value of the firm is highest at that structure, the market price per share would be at its maximum.

This approach can be expressed by the following example:

The following data are available for a firm:

Cost of equity-16%,

Cost of debt-10%;

Operating profit-Rs. 25,000;

Capital employed-Rs. 2, 50,000;

The firm has alternative debt to capital employed ratio: 0; 0.3; 0.6; 0.9; and 1.0.

Ascertain optimal capital structure.

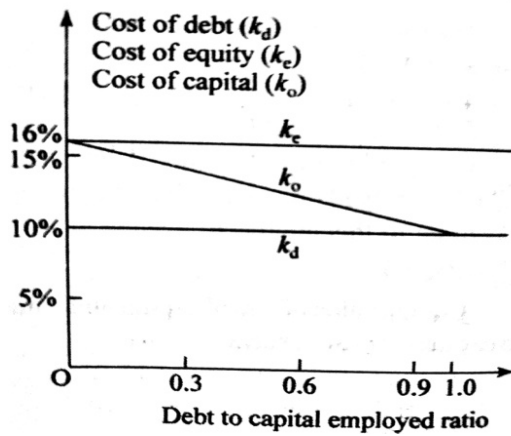
Table shows required calculations of determining cost of capital and value of the firm

| Debt to capital employed Particulars | 0.0 Rs. | 0.3 Rs. | 0.6 Rs. | 0.9 Rs. | 1.0 Rs. |
|--|----------|----------|----------|----------|----------|
| Equity share capital | 2,50,000 | 1,75,000 | 1,00,000 | 25,000 | 0 |
| Debt capital | 0 | 75,000 | 1,50,000 | 2,25,000 | 2,50,000 |
| Operating profit(O) | 25,000 | 25,000 | 25,000 | 25,000 | 25,000 |
| Less: Interest(I) | 0 | 7,500 | 15,000 | 22,500 | 25,000 |
| Earnings available to equity shareholders (E= O-I) | 25,000 | 17,500 | 10,000 | 2,500 | 0 |
| Market value of debt ($B = \frac{I}{K_d}$) | 0 | 75,000 | 1,50,000 | 2,25,000 | 2,50,000 |
| Market value of equity ($S = \frac{E}{K_e}$) | 1,56,250 | 1,09,375 | 62,500 | 15,625 | 0 |
| Market value of firm (V=B+S) | 1,56,250 | 1,84,375 | 2,12,500 | 2,40,625 | 2,50,000 |
| Cost of capital ($\frac{O}{V}$) | 16% | 13.56% | 11.76% | 10.39% | 10% |

The above table reveals that with an increase in the use of debt capital in the capital structure, the cost of capital declines and the value of the firm goes up. As a result, when the firm maintains a debt to capital employed ratio of 1, K_o is minimum and V is maximum.

So, according to NI approach, the company will reach its optimal capital structure if it uses 100% debt capital in its capital structure.

Graphically this can be shown as follows:



In this figure debt to capital employed is plotted on the horizontal axis and K_d , K_e and K_o are plotted on vertical axis. From the figure it is clear that as debt to capital employed ratio increases, K_e decreases because the proportion of debt, the cheaper source of finance, increases in the capital structure. The optimal capital structure is reached when debt to capital employed ratio is 1.

We know that the cost of capital is given by

$$K_o = K_d \frac{B}{V} + K_e \frac{S}{V}$$

Again we know that $V=B+S$

So, we write

$$\frac{B}{V} + \frac{S}{V} = 1 \quad \frac{S}{V} = 1 - \frac{B}{V}$$

= (1-x) where $x = B/V$

$$K_o = K_d \frac{B}{V} + K_e \frac{S}{V}$$

$$K_o = K_d \cdot x + K_e (1-x)$$

$$K_o = K_e + (K_d - K_e) \cdot x$$

This equation shows that given K_o , K_d and K_e depends on x . As x changes, the overall cost of capital (K_o) changes.

It is noted that $d/dx(K_o) = (K_d - K_e)$

If $B=0$, then, $B/V = 0$; i. e., $K_o = K_e$. It means that there is no debt capital, the cost of capital is equal to cost of equity capital. In the limiting case where $x=1$, $K_o = K_d$ the cost of capital becomes the cost of debt capital. Thus, the optimal capital is reached when debt capital is the only form of capital.

LIMITATIONS:

- i) In this theory it is assumed that cost of debt and cost of equity remain constant. This assumption does not hold well in real world situation.
- ii) This approach also assumes that cost of debt is lower than cost of equity. But it does not happen in all times.
- iii) The assumption of non-existence of corporate taxes is totally unrealistic assumption.

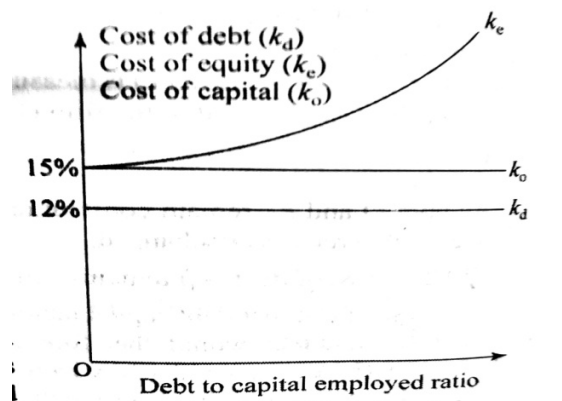
NET OPERATING INCOME APPROACH (NOI)

This theory was also developed by David Durand in 1961. In addition to the list of common assumption described earlier, this theory makes further assumptions which are as follows:

- i) The overall cost of capital is independent of capital structure; this means that K_o remains the same for all debt- equity ratios.
- ii) Value of the firm (V) is measured by dividing the firm's operating profit (O) by the overall cost of capital of the firm. Thus, $V = O/K_o$. As both O and K_o remain constant and are not influenced by the degree of financial leverage, V also remains unchanged.
- iii) The cost of debt (K_d) remains constant.

If the use of cheaper debt capital increases, the equity shareholders are required to bear additional risk and they would, therefore, expect a higher return on equity. As a result cost of equity (K_e) goes up with every increase in the debt equity ratio. Thus advantage of having cheaper debt capital is lost to the company as there will be an offsetting increase in its cost of equity. Thus, there is no single one optimal capital structure to the company as its cost of capital remains the same for all debt- equity ratios.

The NOI Approach is graphically shown as below:



Effect of capital structure on cost of capital

Debt to capital employed ratio is plotted on the horizontal axis and k_d , k_e and k_o are plotted on vertical axis. The figure reveals that k_o is equal to k_e when the debt to capital employed ratio is equal to zero. Then with every increase in this ratio, k_e goes up in such a manner that k_o remains the same as before. Hence, any capital structure is treated as optimal capital structure for the company.

The NOI approach is not free from criticisms for the following reasons:

- i) This theory assumes that the advantages of using cheaper debt capital are offset exactly by the increase in the cost of equity. As a result, the overall cost of capital and the value of the firm do not change with change in the degree of financial leverage and thus, all capital structures are optimal. But, all possible combinations of debt and equity cannot yield the same outcome in the real world situation.
- ii) In this theory it is assumed that cost of debt is constant. This is not true; cost of debt does not remain constant especially in the long run.
- iii) In this theory it is assumed that firm's net operating profit is does not change. It implies that there is no variability in the net operating profit of the firm and as a result, the business risk associated with the firm remains constant. This is also an absurd proposition.

TRADITIONAL APPROACH

The NI approach and the NOI approach represents two extremes with regard to the relationship between the capital structure, overall cost of capital and the total value of the firm. Prof. Ezra Solomon adopted this traditional approach in a way which is realistic and acts as a compromise between NI approach and NOI approaches. This traditional approach is also known as intermediate approach. This approach states to the view of the NI approach that the cost of capital and total value of the firm are not independent of capital structure. But it disagrees with the view of NI approach that a firm can continuously enjoy a higher market value by increasing its debt-equity ratio. On the other hand, the

traditional approach shares a feature with the NOI approach that beyond a certain value of debt- equity ratio (or a certain degree of financial leverage); the overall cost of capital increases which results in a decrease in the total value of the firm. However at the same time, the traditional approach disagrees with the proposition of NOI approach that the overall cost of capital is constant for all degrees of leverage (all values of debt-equity ratio).

The optimal capital structure is that combination of debt and equity at which the overall cost of capital is minimum and the market value of the firm is maximum.

There are two variants of this traditional approach. These are:

FIRST VARIANT: According to this variant, up to a certain point, an increase in the proportion of debt capital in the capital structure reduces the overall cost of capital and increases the value of the firm. Beyond that the overall cost of capital tends to rise and the value of the firm tends to decrease with a further increase in the debt equity ratio of the firm.

Therefore, up to a certain point, the increase in portion of debt capital in the capital structure decreases the overall cost of capital and increases the total value of the firm; and beyond that point, the overall cost of capital increase and the value of the firm decreases.

SECOND VARIANT: According to this variant of the traditional approach, the impact of the use of the debt capital in the capital structure of the firm on its overall cost of capital and its total value can be divided into three distinct phases. These are:

Phase-I:

During the first phase -i) The cost of debt remains constant or increases to a very small extent and

ii) The cost of equity remains constant or begins to rise but does not rise fast enough to offset the advantage of using cheaper debt capital. As a result, in this phase with an increase in the proportion of debt capital in the capital structure, the overall cost of capital declines and the total value of the firm goes up.

Phase-II:

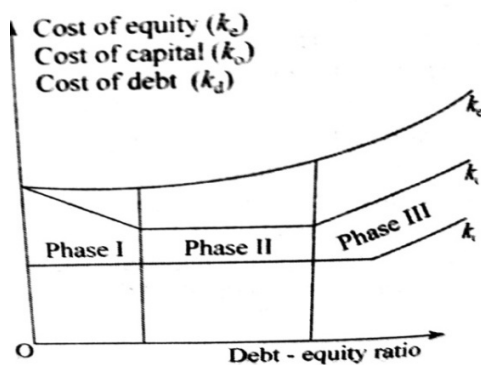
After a certain degree of financial leverage is reached, the use of additional debt capital in the capital structure has an insignificant effect on the overall cost of capital and the market value of the firm.

During this phase both the cost of equity and cost of debt increase in such a way so that the combined effect on the overall cost of capital remains unchanged. Thus, the overall cost of capital and the value of the firm remain constant during this phase.

Phase III:

Any further increase in the debt-equity ratio beyond a certain critical point is considered to threaten the interest of both suppliers of debt capital and equity capital. As financial risk increases sharply, both the cost of equity and cost of debt start rising rapidly. As a result, during this phase the overall cost of capital increases and the value of the firm decreases with the use of every additional dose of debt capital in the capital structure.

Graphically this can be shown as follows:



Effect of capital structure on cost of capital

Debt -equity ratio is plotted on the horizontal axis and K_d , K_e and K_o are plotted on vertical axis. The figure reveals that the overall cost of capital (K_o) is saucer shaped. It implies that debt equity ratios corresponding to the bottom of the curve constitute the optimal range. It shows that there is range of debt equity ratio in which the overall cost of capital is minimized and the value of the firm is maximized.

This traditional approach is not free from criticism for the following reasons:

- i) According to the traditional approach, levered firms are more valuable than unlevered firm in the hands of the investors and thus, they are ready to pay a premium for the shares of levered firms. But in reality it is not true as the value of the firm does not depend only on its capital structure rather it is influenced by several factors such as its profitability, risk profile etc.
- ii) The traditional approach suggests that investors' perception about risk of investment is different levels of financial leverage. But as compared to the real world situation, adequate justification in the above proposition is not present.

MODIGLIANI- MILLER HYPOTHESIS:

According to MM Hypothesis that there is no influence of the capital structure of a firm on its cost of capital and market value. That is, overall cost of capital and market value of the firm are independent of the capital structure.

This hypothesis is based on the following assumptions:

- i) The capital market are perfect i, e
 - a) There is no transaction cost.
 - b) Information is freely available.
 - c) There is no bankruptcy cost.
 - d) Securities are finitely divisible.
 - e) Investors can borrow without restrictions on the same terms and conditions as the firm can.
 - f) Investors are rational and behave accordingly.
- ii) Investors have identical expectations about future operating earnings.
- iii) Firms operate in similar business conditions and similar business risk.
- iv) The dividend payout ratio is 100%.
- v) There is no corporate tax.

Based on the above assumptions, MM developed two propositions. These are discussed below:

i) Proposition -I

The first proposition of the M-M theory states that the market value of the firm is independent of its capital structure and is given by capitalizing its expected net operating income by a rate appropriate to its risk class (overall cost of capital) .This can be stated symbolically as follows:

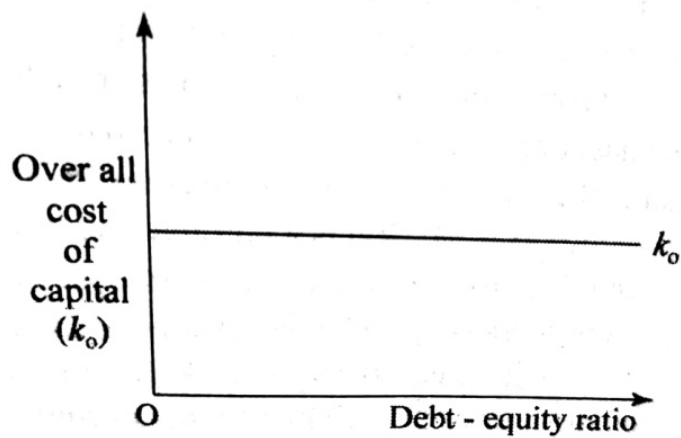
$$V = B + S = \frac{O}{K_o} \text{ or,}$$

$$K_o = \frac{O}{V}$$

$$\text{or, } K_o = K_d \frac{B}{V} + K_e \frac{S}{V}$$

The net operating income (O) is not influenced by the sources from which the funds have been raised and thus, it is independent of capital structure. As both O and K_o are independent of capital structure, V is also a constant and is not influenced by the capital structure. This proposition is identical with the NOI approach.

This is shown in the following figure:



Effect of capital structure on cost of capital

Modigliani and Miller developed an argument in favour of a homemade or personal leverage in order to prove their first proposition. The M-M hypothesis states that two firms with identical assets, irrespective of how these assets have been financed cannot have different market values. But if any difference in their market values arises, a switching process will take place to enable the investors to engage in the personal leverage as against the corporate leverage for maintaining equilibrium in the market.

Proposition -II

The second proposition of the M-M hypothesis is that the cost of equity (K_e) is equal to the overall cost of capital (K_o) plus a premium for financial risk where the premium for financial risk is quantified by the product of the debt-equity ratio (B/S) and the spread between the constant overall cost of capital (K_o) and the cost of debt (K_d).

This proposition can be expressed as follows:

$$K_e = K_o + (K_o - K_d) \frac{B}{S}$$

We can write

$$K_o = K_e \times \frac{S}{B+S} + K_d \times \frac{B}{B+S}$$

$$\text{Or, } K_e \times \frac{S}{B+S} = K_o - K_d \times \frac{B}{B+S}$$

$$\text{Or, } K_e = \frac{B+S}{S} \left[K_o - K_d \times \frac{B}{B+S} \right]$$

$$\text{or, } K_e = \frac{B+S}{S} \times K_o - \frac{B+S}{S} \times K_d \times \frac{B}{B+S}$$

$$\text{or, } K_e = \frac{B}{S} \times K_o + K_o - K_d \times \frac{B}{S}$$

$$\text{Or, } K_e = K_o + (K_o - K_d) \frac{B}{S}$$

This equation implies that there is no relationship between K_e and B/S . K_e increase in a manner to offset exactly the use of a less expensive source of funds represented by debt capital. As a result, the market value of a firm remains unchanged.

INTERPRETATION OF M-M HYPOTHESIS

When proposition I and II of M-M hypothesis are combined, it implies that although debt is considered as a cheaper source of capital as compared to equity, introduction of additional dose of debt capital in the capital structure of the firm does not increase its value because advantage arising out of using cheaper debt capital is exactly offset by the increase in the cost of equity. So, the capital structure of the firm has no bearing on its value.

CRITICISMS OF M-M HYPOTHESIS:

The major areas of criticisms of M-M hypothesis are:

- i) In the M-M hypothesis it is assumed that the firms and individuals can borrow and lend at the same rate of interest. But it is unrealistic because the firms have higher credit standing because of holding more assets and better credit reputation.
- ii) In this theory it is assumed that personal/homemade leverage is a perfect substitute of corporate leverage. It also unrealistic.
- iii) In this theory it is assumed that there is no transaction cost, it is also unrealistic because in reality transaction costs do exist.
- iv) In this theory it is assumed that there is no corporate tax, it is also unrealistic because in real world corporate income tax exists.
- v) In this theory it is assumed that dividend payout ratio is 100%. But, generally firm does not distribute 100% of earnings as dividend.
- vi) In this theory it is assumed that all firms have similar business risk. Business risk depends on firm-specific, industry-specific and economy-specific. So, due to firm-specific and industry-specific factors all firms do not have similar degree of business risk.

References: I) Managerial Economics: By R.L.Varshney and K.L. Maheshwari (Sultan Chand & Sons) 7th Edition,1981

ii) Financial management: By I.M Pandey (Vikas Publishing House Pvt. Ltd.) 1979

iii) An Introduction to Financial Management: By Debasis Sur and Joydeb Sarkhel (Book Syndicate Private Limited) 1st Published January 2013