

## (b) Net Operating Income (NOI) Approach

This approach is diametrically opposite to the NI approach. According to this approach, the value of a firm is not at all affected by the changes in its capital structure.

### Assumptions -

- i) Under this approach, overall cost of capital ( $K_0$ ) and value of the firm ( $V$ ) are both constant at different degrees of financial leverage.
- ii) Cost of debt ( $K_d$ ) is also constant at different degrees of financial leverage.
- iii) Cost of equity ( $K_e$ ) increases with increase in degree of leverage. Greater use of debt capital having a low cost increases the financial risk of the equity shareholders. Hence, to compensate that risk, the shareholders would expect higher rates of return on their investment. This will cause an increase in the cost of equity capital. Thus, the advantage of debt is set off exactly by an increase in the cost of equity capital.
- iv) There is no corporate tax.
- v) Under this approach there is no optimum debt-equity mixture because ' $K_0$ ' and ' $V$ ' are both constant at different degrees of financial leverage. Any capital structure can be considered as an optimum capital structure for a firm.

## Formulae—

i) Value of the firm ( $V$ ) =  $\frac{EBIT}{K_0}$ , which is constant.

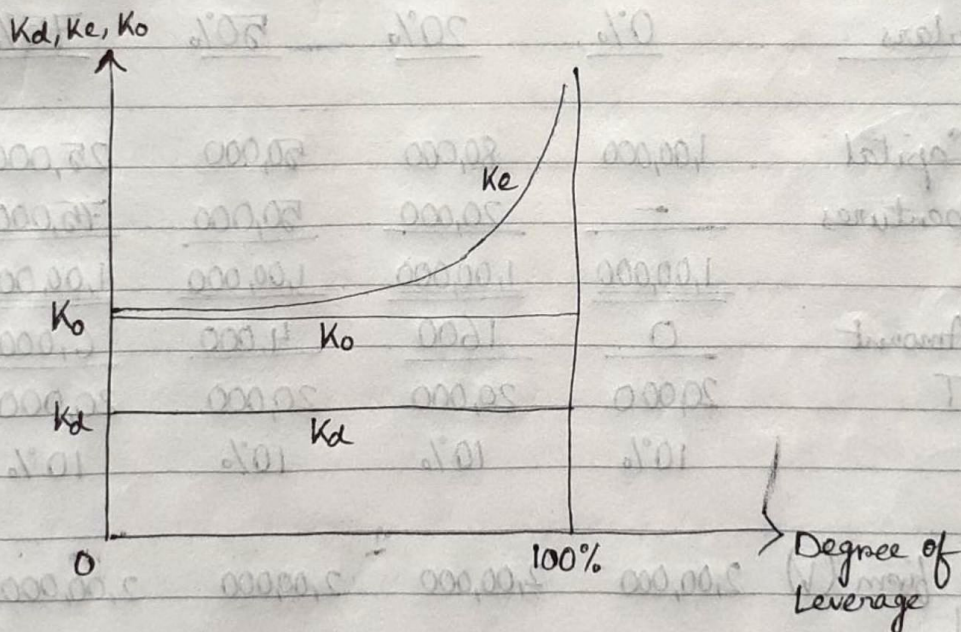
ii) Market value of Debt ( $D$ ) =  $\frac{\text{Interest}}{K_d}$

iii) Market value of Equity ( $E$ ) =  $V - D$

iv) Cost of equity ( $K_e$ ) =  $\frac{EBIT - I}{E} \times 100$

Alternatively,

$$K_e = K_0 + (K_0 - K_d) \left( \frac{D}{E} \right)$$



In the above diagram it is evident that  $K_0$  and  $K_d$  are constant at different degrees of financial leverage. Also, the cost of debt ( $K_d$ ) is less than the cost of equity capital ( $K_e$ ) i.e.  $K_d < K_e$ .

E.g. Total Investment = ₹ 1 lakh

EBIT = ₹ 20,000

Cost of Debt = 8%

Overall Cost of Capital = 10%

Corporate Tax = Nil

Degree of Leverage — 0%, 20%, 50%, 75%, 100%

Determine —

- i) Value of the firm
- ii) Value of debt
- iii) Cost of equity
- iv) Market value of equity under NOI approach and comment.

Soln: Determination of Market value of the firm, Market value of Equity and Cost of Equity under NOI approach

<u>Particulars</u>	<u>0%</u>	<u>20%</u>	<u>50%</u>	<u>75%</u>	<u>100%</u>
Equity Capital	1,00,000	80,000	50,000	25,000	—
8% Debentures	—	20,000	50,000	75,000	1,00,000
	<u>1,00,000</u>	<u>1,00,000</u>	<u>1,00,000</u>	<u>1,00,000</u>	<u>1,00,000</u>
Interest Amount	<u>0</u>	<u>1,600</u>	<u>4,000</u>	<u>6,000</u>	<u>8,000</u>
EBIT	20,000	20,000	20,000	20,000	20,000
$K_0$	10%	10%	10%	10%	10%
Value of the firm (V)	2,00,000	2,00,000	2,00,000	2,00,000	2,00,000
$\left[ \frac{\text{EBIT}}{K_0} \right]$					
Mkt. Value of Debt (D)	0	20,000	50,000	75,000	1,00,000
$\left[ \frac{\text{Interest}}{K_d} \right]$					
Mkt. Value of Equity (E)	2,00,000	1,80,000	1,50,000	1,25,000	1,00,000
$[V - D]$					
Cost of Equity ( $K_e$ )	10%	10.22%	10.67%	11.2%	12%
$\left[ \frac{(\text{EBIT} - I) \times 100}{E} \right]$					

### Comment

Under NOI approach, Value of the firm ( $V$ ) will be ₹ 2 lakhs at different degree of leverages and Overall cost of capital ( $k_0$ ) is 10% under different degree of leverages. Hence, there is no ~~problem~~ optimum debt-equity mixture under NOI approach i.e. any combination of debt-equity is optimum.

### Illustration 2.

P. Ltd. has operating profit of ₹ 1,00,000 and its overall cost of capital is 10% and cost of debt capital is 6%. The company has employed debt capital of ₹ 5,00,000.

- (a) Compute the value of equity capital and cost of equity capital under Net Operating Income (NOI) approach.
- (b) What will be the implication for increase in the debt capital from ₹ 5,00,000 to ₹ 7,00,000.

[Almost similar to C.U. M.Com., 2009]

### Solution :

#### (a) Computation of Value of Equity Capital and Cost of Equity Capital ( $K_e$ ) under Net Operating Income (NOI) approach

We know that,  $V = D + S$

$$\text{or, } S = V - D$$

where,  $V$  = Value of the firm

$D$  = Value of the debt capital

$S$  = Value of Equity capital

$$\text{Value of the firm (V)} = \frac{EBIT}{K_o} = \frac{\text{₹ } 1,00,000}{10\%} = \text{₹ } 10,00,000$$

$$\text{Less : Value of the Debt Capital (D)} = \frac{I}{K_d} = \frac{(6\% \text{ of } \text{₹ } 5,00,000)}{6\%} = \text{₹ } 5,00,000$$

$$\text{Value of Equity Capital (S)} = \text{₹ } 5,00,000$$

$$\begin{aligned} \text{Now, Cost of Equity Capital (K}_e\text{)} &= \frac{EBIT - I}{S} \\ &= \frac{(\text{₹ } 1,00,000 - \text{₹ } 30,000)}{\text{₹ } 5,00,000} = \frac{\text{₹ } 70,000}{\text{₹ } 5,00,000} = 0.14 \text{ or } 14\% \end{aligned}$$

Alternatively,

Cost of Equity Capital may be computed as follows :

$$\begin{aligned}
 K_e &= K_o + (K_o - K_d) \left( \frac{D}{S} \right) \\
 &= 0.10 + (0.10 - 0.06) \left( \frac{\text{₹}5,00,000}{\text{₹}5,00,000} \right) \\
 &= 0.10 + 0.04 \\
 &= 0.14 \text{ or } 14\%
 \end{aligned}$$

Verification of NOI approach by calculating  $K_o$  of the firm.

$$\begin{aligned}
 K_o &= K_d \left( \frac{D}{V} \right) + K_e \left( \frac{S}{V} \right) \\
 &= 0.06 \left( \frac{5,00,000}{10,00,000} \right) + 0.14 \left( \frac{5,00,000}{10,00,000} \right) \\
 &= 0.03 + 0.07 \\
 &= 0.10 \text{ or } 10\%.
 \end{aligned}$$

(b) Value of the firm (V) =  $\frac{EBIT}{K_o} = \frac{\text{₹}1,00,000}{10\%} = \text{₹}10,00,000$

Less : Value of Debt Capital (D) =  $\frac{I}{K_d} = \frac{(6\% \text{ of } \text{₹}7,00,000)}{6\%} = \text{₹}7,00,000$

Value of Equity Capital (S) =  $\text{₹}3,00,000$

Cost of Equity Capital ( $K_e$ ) =  $\frac{EBIT - I}{S}$

$$\begin{aligned}
 &= \frac{(\text{₹}1,00,000 - \text{₹}42,000)}{\text{₹}3,00,000} \\
 &= 0.1933 \text{ or } 19.33\%.
 \end{aligned}$$

Therefore, the essence of Net Operating Income approach is that the market value of the firm (V) remains the same (₹10,00,000 in the above illustration) irrespective of the method of financing i.e. it is not affected by the use of debt capital. Again, since the values of  $K_d$  and  $K_o$  remain constant, the equity capitalisation rate/cost of equity ( $K_e$ ) increases (from 14% to 19.33%) with the increase in debt capital (from ₹5,00,000 to ₹7,00,000) in the total capital structure.

The NOI approach may be represented with the help of a diagram (Fig.-2) based on the data used in illustration 2 above.

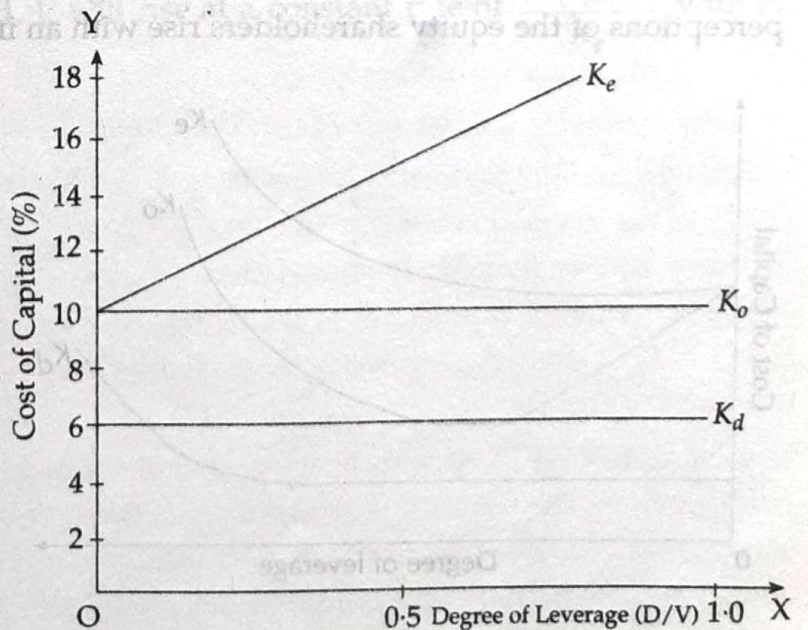


Fig.-2

In Fig.-2, We have measured the degree of leverage along the horizontal axis and the cost of capital (i.e. the percentage rates of  $K_d$ ,  $K_o$  and  $K_e$ ) along the vertical axis. The  $K_d$  and  $K_o$  curves remain parallel to X-axis since we have assumed that  $K_d$  and  $K_o$  remain independent of the degree of leverage. But if the degree of leverage  $\left(\frac{D}{V}\right)$  increases, the cost of equity ( $K_e$ ) increases continuously.

#### ► Criticisms of Net Operating Income Approach :

This theory has also been criticised on the following grounds :

- (a) This approach presumes that the benefits from the use of cheaper debt capital will be just offset by the increase in the cost of equity. Therefore, the value of the firm will remain unchanged. But this seems to be an absurd proposition and is unlikely to happen in reality.
- (b) Under this approach, change in the capital structure of a firm does not affect the market value of the firm and every capital structure is the optimum capital structure, provided there are no corporate taxes. However, when the existence of taxes are assumed, the optimum capital structure can be achieved by maximising the debt mix in the capital structure of a firm.
- (c) According to this approach, there will be no optimum capital structure of any firm. If this is true, there will be no need of any financial plan for any firm.

### Illustration 9.

Jet Ltd. has a cost of debt and overall cost of capital of 8% and 12% respectively. The ratio of market value of debt ( $D$ ) to market value of Equity ( $S$ ) is 0.6. Find out the required rate of return of the equity investors,  $K_e$ , given that there is no tax.

#### Solution :

This is the case of Net Operating Income (NOI) approach as the cost of debt ( $K_d$ ) and overall cost of capital ( $K_o$ ) are given and cost of equity ( $K_e$ ) is to be ascertained.

The  $K_e$  under NOI approach can be computed as follows :

$$\begin{aligned} K_e &= K_o + (K_o - K_d) \left( \frac{D}{S} \right) \\ &= 0.12 + (0.12 - 0.08) (0.60) \\ &= 0.12 + 0.024 \\ &= 0.144 \text{ or, } 14.4\% \end{aligned}$$



### Illustration 13.

From the following particulars determine the market value of the firm ( $V$ ), market value of equity ( $S$ ) and cost of equity ( $K_e$ ) under Net Operating Income (NOI) Approach of XYZ Ltd.

- (1) Net operating income of the company is ₹ 1,00,000
- (2) Total amount of investment is ₹ 5,00,000
- (3) Assume that there is no corporate tax.

Following estimates of the cost of debt and overall cost of capital have been made at various level of the debt-equity mix for XYZ Ltd.

% of Debt	Cost of Debt ( $K_d$ )	Overall Cost of Capital ( $K_o$ )
0%	—	15%
20%	10%	15%
50%	10%	15%
75%	10%	15%

Which of the capital structure will you recommend, and why ?

**Solution :**

**Computation of Market Value of the Firm ( $V$ ), Equity ( $S$ ) and Cost of Equity ( $K_e$ ) under Net Operating Income (NOI) Approach**

Particulars	% of Debt to Total Capital Employed			
	0	20	50	75
Amount of Debt Capital (₹)	—	1,00,000	2,50,000	3,75,000
Amount of Equity Capital (₹)	5,00,000	4,00,000	2,50,000	1,25,000
Total Capital Employed (₹)	5,00,000	5,00,000	5,00,000	5,00,000
EBIT/Net Operating Income (₹)	1,00,000	1,00,000	1,00,000	1,00,000
Less : Interest (₹)	—	10,000	25,000	37,500
Earnings available to equity shareholders/Equity Earnings ( $E_e$ ) (₹)	1,00,000	90,000	75,000	62,500
Market Value of the Firm ( $V$ )	6,66,667	6,66,667	6,66,667	6,66,667
$\left[ \frac{EBIT}{K_o} \right]$				
Less : Market value of Debt Capital ( $D$ )	—	1,00,000	2,50,000	3,75,000
$\left[ \frac{I}{K_d} \right]$				
Market Value of Equity ( $S$ ) [ $V - D$ ]	6,66,667	5,66,667	4,16,667	2,91,667
Cost of Equity ( $K_e$ ) [ $E_e/S$ ]	15%	15.88%	18%	21.43%

**Comment :**

In this case the market value of the firm ( $V$ ) is constant (i.e., ₹ 6,66,667) irrespective of the level of debt capital and hence, there is no optimum capital structure under NOI approach and every capital structure is the optimum capital structure. This approach assumes that the overall cost of capital ( $K_o$ ) is unchanged irrespective of the level of gearing. It implies that the overall cost of capital remains the same at any debt-equity mix. The underlying assumption behind this approach is that the increase in the employment of debt capital increases the expected rate of return by the equity shareholders and the benefit of using relatively cheaper debt funds is offset by the loss arising out of the increase in cost of equity ( $K_e$ ).