

Capital Structures

Meaning: The Particular Combination of debt and Equity used by a Company to finance its overall operations and growth.

Capital Structure Planning:

Capital Structure Planning is the Process of deciding how a Company will finance its operations and growth, by determining the optimal mix of debt and Equity financing.

Aim of Capital Structure Planning:

- (1) Minimize the Cost of Capital
- (2) Maximize firm value and Ensure Financial Flexibility

Components of Capital Structure:

(1) Equity: Represents Ownership in the Company. Ex Common Stock, Retained Earnings

(2) Debt: Represents borrowed Capital Ex Loans, bonds, (Borrowed funds from external sources. - Debentures)

Factors Affecting Capital Structure:

- (1) Cash Flow position (CFP)
- (2) Interest Coverage Ratio (ICR)
- (3) Debt Service Coverage Ratio (DSCR)
- (4) Return on Investment (ROI)
- (5) Cost of Debt
- (6) Tax Rate
- (7) Cost of Equity Capital
- (8) Floatation Costs
- (9) Risk Consideration

- (10) Flexibility
- (11) Control
- (12) Regulatory Framework
- (13) Stock Market Conditions
- (14) Capital Structure of other similar companies.

(1) Cash Flow Position (CFP)

Debt capital should be used only if the cash flow position is really good. Because a lot of cash is needed in order to make payment of interest and Refund of capital.

(2) Interest Coverage Ratio (ICR)

With help from this ratio an effort is made to find out how many times the EBIT available to the payment of Interest.

EBIT = Earnings Before Interest and Taxes
Formula: $EBIT$

$$(1) EBIT = \text{Net Income} + \text{Interest Expenses} + \text{Taxes}$$

$$(11) EBIT = \text{Revenue} - \text{Cost of Goods sold} - \text{Operating Expenses}$$

(3) DSCR:

This ratio removes the weakness of ICR and shows the Cash Flow Position of the Company.

(4) Return on Investment: (ROI)

The greater return on investment of a company, increases its capacity to utilize more debt capital.

(5) Cost of Debt:

The capacity of a Company to take debt depends on the cost of the debt.

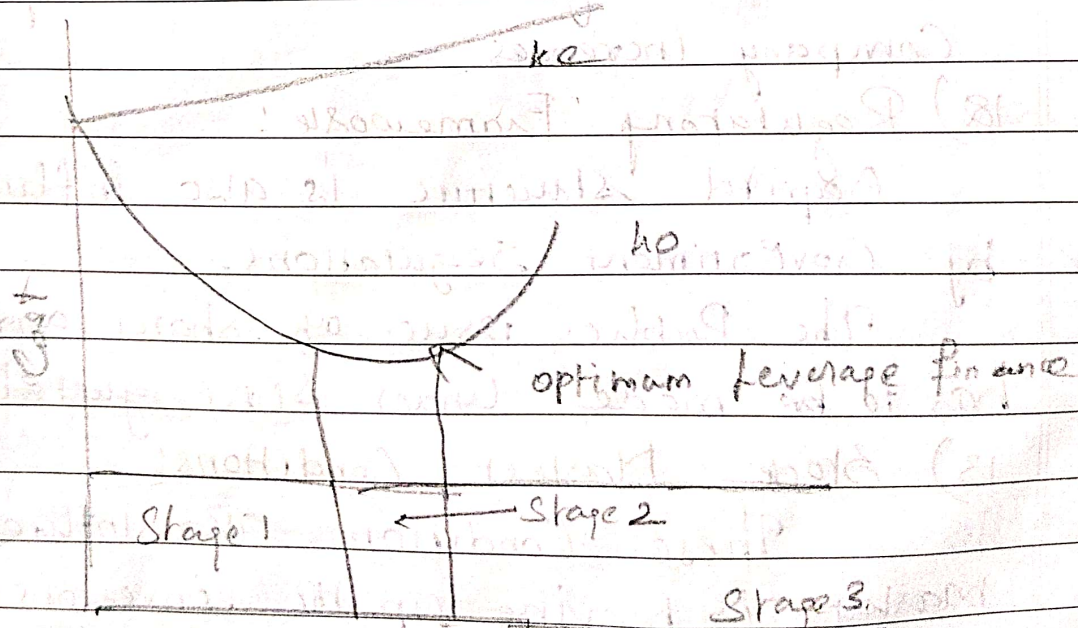
(b) Tax Rate:

The Tax rate affects the cost of debt. If the rate of tax is high, the cost of debt decreases. Tax Rate $\uparrow$ Cost of debt $\downarrow$.

(7) Cost of Equity Capital:

It means the expectations of the equity shareholders from the company.

The higher the expectations the more should be the cost of equity capital.



8) Flotation Costs:

Floating costs are those expenses which are incurred while issuing securities a) equity shares b) preference shares c) debentures etc.

This attracts the Company towards debt Capital.

(9) Risk Consideration:

There are two types of risk in business - operating risk or business risk, and financial risk. This also attracts the company towards debt Capital.

(10) Flexibility:

The Capital Structure should be fairly flexible. It means that the amount of Capital in the business could be increased or decreased easily.

(11) Control:

It should be ensured at the time of deciding Capital Structure that the control of existing shareholders to the number of owners controlling the Company increases.

(12) Regulatory Framework:

Capital Structure is also influenced by Government regulations.

The Public issue of shares and debentures has to be made under SEBI guidelines.

(13) Stock Market Conditions:

These Conditions also influence If Market is moving up the investors want to make investments in equity shares to earn higher profits and equity capital appreciation.

14. Capital Structure of other Similar Companies:

It depends upon the industry as well as when they operate in similar and competitive conditions.

Determining Pattern of Capital Structure: There may be some overlapping and contradictions while deciding Capital Structure such as

- (1) Cost Principle
- (2) Risk Principle
- (3) Control Principle
- (4) Flexibility Principle
- (5) Timing Principle

(1) Cost Principle:

The 'optimal Capital Structure' minimizes a company's Market Value while minimizing its cost of capital.

Debt Capital is assumed to be cheaper than equity capital.

Too much debt increases the financial risk to shareholders and the return on equity that they require.

(2) Risk Principle:

The firm should not assume all risk elements to itself to avoid losses.

Equity shareholders carry more amount of risk.

(3) Control Principle:

Management desiring to retain control

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 must raise funds through bonds and Equity Preference Capital

(4) Flexibility Principle :

Flexibility means there should be scope of changes in the proportion of debt and Equity mix as per the requirement.

(5) Timing Principle :

Risk is associated with time, specifically in a growing concern.

This principle enables the firm to seize market opportunities and minimize the cost of raising capital and obtain substantial savings.

Theories of Capital Structure :

The firm should try to maintain an optimum capital structure with a view to maintaining financial stability.

Financial Manager should be familiar with the following approaches.

(1) Net Income Approach.

(2) Net Operating Approach.

(3) Modigliani Miller Approach.

(4) Traditional Approach.

(1) Net Income Approach :

$$\left[\begin{array}{c} \text{Net} \\ \text{Income} \end{array} \right] = \left[\begin{array}{c} \text{Net Operating} \\ \text{Income (NOI)} \end{array} \right] - \left[\begin{array}{c} \text{Interest on} \\ \text{debt (I)} \end{array} \right]$$

$$V = \frac{NI}{k_e} \quad V = \text{Value of the firm}$$

NI = Net Income

k_e = Cost of equity

So

This theory was Propounded by David Durand professor of Financial Management at MIT in 1959.

The Capital Structure decision is relevant to the Valuation of the firm because a change in the pattern of Capitalization brings about Corresponding Change in the overall cost of capital and total value of the firm.

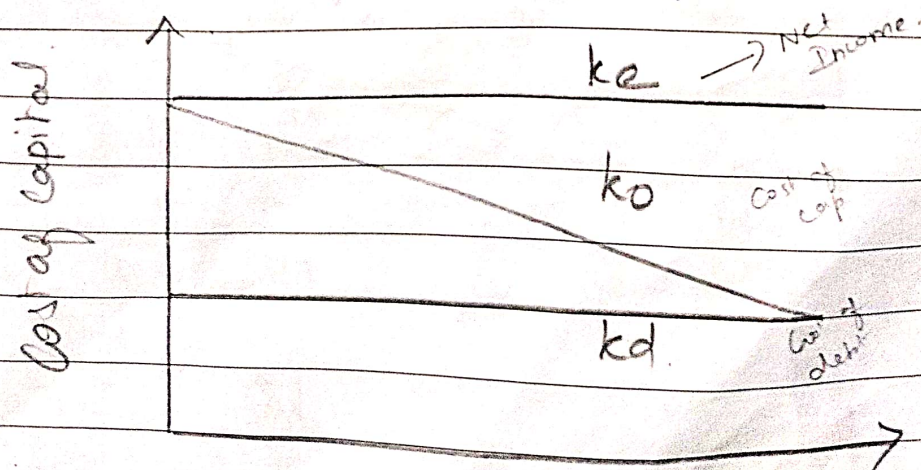
This theory is also known as Fixed " k_e " theory.

Assumptions:

- (1) There are no Corporate Taxes
- (2) The debt content does not change the risk Perception of the investors.
- (3) The cost of debt is less than the cost of equity.
- (4) Constant EBIT.

Strength of NI Approach:

- (1) It tries to explain the effects of borrowings on an overall cost of capital
- (2) It explains and emphasizes on Favourable financial Leverage
- (3) However the theory ignores risk consideration



Financial leverage

II Net Operating Income (NOI) Approach:
This theory propounded by Prof. David Durand

is just opposite of the Net Income approach.

The overall cost of capital and value of the firm is independent of the Capital Structure decision and changes in the degree of financial leverage does not bring about any change in the value of the firm and cost of capital.

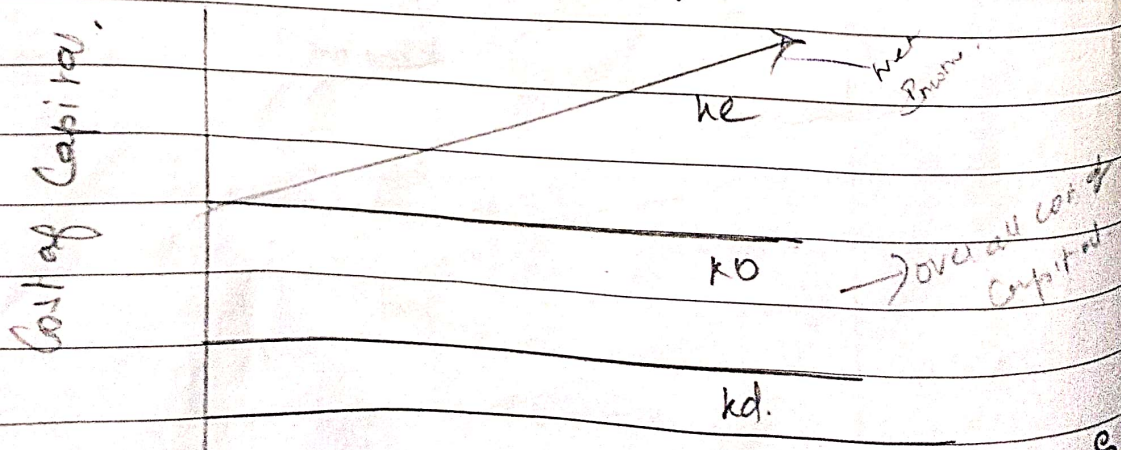
Assumptions:

- (1) The overall cost of capital (k_0) remains constant for all degrees of debt equity mix or leverage.
- (2) There are no corporate tax.
- (3) The market capitalizes the value of the firm as a whole.

$$V = \text{NOI (EBIT)} / k_0$$

Value of firm = Net Operating Income (or EBIT Earnings before interest and tax) / k_0

NOI = Gross Income - Operating Expenses
 k_0 - Overall cost of capital



Financial leverage

III Modigliani - Miller Theory (MM Theory)

This is called a traditional approach

It is similar to NOT approach.

MM theory maintains that the Weighted Average Cost of Capital does not change with the change in the Capital Structure of the firm.

Assumptions:

- (1) Capital Markets are Perfect
- (2) All firms within the same class will have the same degree of business risk.
- (3) All investors have the same expectation of a firm's net operating income (EBIT).
- (4) The dividend payout ratio is 100 per cent. (Shareholders).
- (5) There are no Corporate taxes.

Limitations:

- (1) Rates of interest are not the same for individuals and firms.
- (2) Transactional costs are involved.

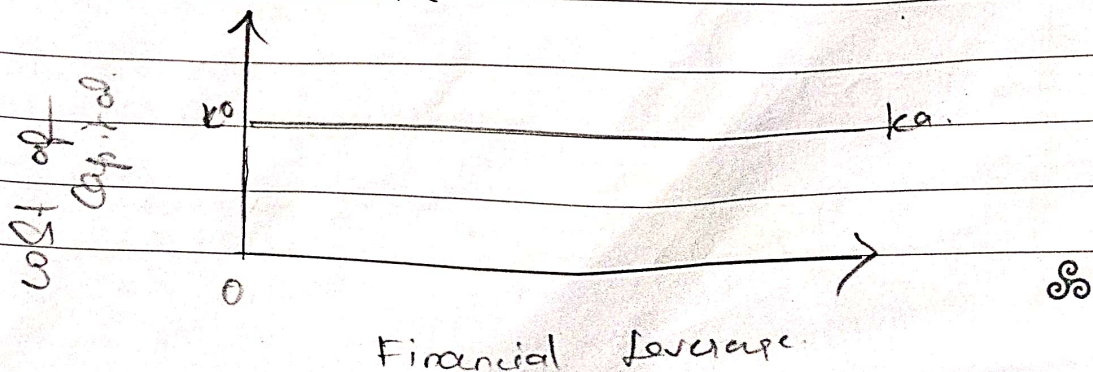
Formula, $V_i = V_u + B \cdot t$

V_i = Value of Levered firm

V_u = Value of an Unlevered firm

B = Amount of debt

t = Tax Rate



IV Traditional Approach:

The traditional theory assumes changes in k_e at different levels of debt equity ratio.

It is the middle of the two extremes of NI and NOI.

Beyond a particular point of debt equity mix, k_e rises at an increasing rate.

Stages:

These are 3 Stages.

(1) Introduction of Debt - Net Income Rises!

The cost of equity capital rises because of risk, but less than earnings rates leads to a decline in an overall cost of capital and increase in market value.

(2) Further Application of Debt:

The cost of equity capital rises - net income - debt cost increases - value remains the same.

(3) Further Application of Debt:

The cost of equity capital is very high which leads to the value going down.

Cost of equity capital $\uparrow$

less earnings.
decline the overall cost
increase market value

Cost of equity capital $\uparrow$

debt cost increase
value remain same

Cost of equity capital very $\uparrow$

- value going down

Leverage and Capital Structure

in Physics: Leverage means the relationship between two interrelated variables.

in financial Analysis: It means when one variable affects the other financial variable

Leverage:

The relationship between Components of Capital Structure is known as Leverage.

Leverage refers to the ability of a firm in employing long term funds having a fixed cost to enhance returns to the owners.

Over / High Leverage:

A firm with a lot of debt in its capital structure is said to be highly levered.

Low Leverage:

A firm with no debt is said to be unlevered.

Low Leverage

High Leverage

Assets Rs. 1000.	Debt Rs. 200.
	Equity Rs. 800.

Assets Rs. 1000	Debt Rs. 800.
	Equity Rs. 200.

Kinds of Leverage:

- (1) Operating Leverage: This affects the Profitability of the firm.
- (2) Financial Leverage: This affects the Surplus of Profit available for equity shareholders.

Formulas:

(1) Operating leverage

$$\text{Operating leverage} = \frac{\% \text{ Change in EBIT}}{\% \text{ Change in Sales}}$$

(or)

$$\left\{ \frac{\text{increase in EBIT}}{\text{EBIT}} \right\}$$

$$\left\{ \frac{\text{Increase in sales}}{\text{Sales}} \right\}$$

(2) Degree of Operating leverage:

$$\left\{ \text{Degree of operating leverage} \right\} = \frac{\text{Contribution}}{\text{EBIT}}$$

(3) Financial leverage: $\frac{\% \text{ changes in EPS}}{\% \text{ Change in EBIT}}$

$$= \frac{\text{increase in EPS} / \text{EPS}}{\text{Increase in EBIT} / \text{EBIT}}$$

(4) Degree of Financial leverage:

$$\frac{\text{EBIT}}{\text{EBIT} - \text{Fixed financial charge}} = \frac{\text{EBIT}}{\text{EBT}}$$

(5) Combined leverage

$$\text{Combined leverage} = \text{Operating leverage} \times \text{Financial leverage}$$

(6) Degree of Combined leverage = Degree of Operating leverage $\times$ Degree of Financial leverage

Cost of Capital.

Cost of Capital is an important Concept. Many aspects such as,

- (1) Long term value of Shareholders.
- (2) Rate of Interest.
- (3) Exchange Rate.
- (4) Derivatives
- (5) Securities etc.

are directly or indirectly linked with it.

Definition:

It can be defined as the minimum rate of return that a firm must earn on its investment, to keep the value of Equity Shares of the firm intact.

In operational term it can be defined as, Discount Rate used to discount the future cash inflows to determine their Present Value and compare it with the investment Outlay.

Basic Components:

It has 3 basic Concepts.

- (1) Return at Zero risk Level.
- (2) Premium for business Risk.
- (3) Premium for Financial Risk.

Calculation of Cost of Capital : Formula.

$$K = R_0 + b + f$$

K = cost of capital.

R_0 = Return at Zero risk level (risk free return)

b = Premium for business risk

f = Premium for financial risk

Observations:

(1) Cost of Capital with business risk >
Cost of Capital with no risk.

(2) Cost of Capital with financial risk >
Cost of Capital with business risk >
Cost of Capital with no risk.

Cost of Equity Capital:

This is the cost of the estimated stream of net capital outlays desired from equity sources.

It is the discount rate which equates the present value of all the expected dividends in future with net Proceeds per share current Market Price.

The cost of Equity Capital is difficult to measure due to the following reasons:

- (1) The cost of is not the out of pocket cost by making use of equity capital.
- (2) It is based on the stream of future dividends as expected by shareholders.
- (3) Dividend is also affect the Market value.

Cost of Preference Capital:

This capital cost represents the rate of return that must be earned on preferred stocks financed investments to keep the earnings available to residual stockholders unchanged.

This Cost Can be estimated by dividing the dividend stipulated per share by the current Market price of the share.

$$\left. \begin{array}{l} \text{Cost of Preference} \\ \text{Capital} \end{array} \right\} = \frac{\text{Dividend}}{\text{Face value} - \text{Issue cost}} \times 100$$

Cost of Retained Earnings:

The Fund retained in the firm are assumed to be without any cost. These can be called as Undistributed Profits.

The Minimum cost of retained earnings is the Cost of Equity Capital (k_e).

Dr. Solomon - suggested the concept of equity External Yield to measure Cost of Retained Earnings.

Formula:

$$\left(\frac{d_1 + G}{P_0} \right) (1 - TR) (1 - B)$$

k_e - Cost of equity Capital based on dividend growth Method.

(a)

Net Cost of equity Capital = $k_e (1 - TR) (1 - B)$

TR - Shareholders tax Rate

B - Percentage Brokerage Cost.

Example: A firm cost of equity capital is 12% and tax rate of majority of shareholders is 30% and brokerage is 3%.

Solution:

$$\left. \begin{array}{l} \text{Net cost of} \\ \text{Equity capital} \end{array} \right\} = k_e (1 - \text{TR}) (1 - B)$$

30% 3%

$$= 12\% (1 - 0.30) (1 - 0.03)$$

$$= 8.15\%$$

Weighted Cost of Capital:

This cost is also known as Composite cost of capital or weighted Marginal cost of capital. It is the average of the cost of each source of funds employed by the firm and properly weighted by the proportion they hold in the Capital Structure of the firm.

Choice of weights:

- (1) Book value weights based on values in the books of accounts.
- (2) Market value weights. The current value of various instruments of raising funds employed by the company.
- (3) Historic weights: It can be the book or Market weights based on actual data.
- (4) Target weights: It reflects the desired Capital Structure proportions.

Cost of debt :

The effective interest rate that a company pays on its debts, such as bonds and loans.

Calculation of Cost of debt :

(a) After tax Cost of debt :

After tax Cost of debt, which considers the tax deductibility of interest payment
Formula :

$$\text{After tax Cost of debt} = \text{Pre tax Cost of debt} * (1 - \text{Tax Rate})$$

(b) Pre Tax Cost of Capital :

Initial Cost of borrowing, often represented by the interest rate on loans or bonds.

Formula :

$$\text{Pre tax Cost of debt} = \frac{\text{Total Interest Expense}}{\text{Total Debt}}$$

Factors Affecting Capital Structure

Internal Factors

External Factors

Factors influencing Capital Structure:

- (1) Cost of Capital: The cost of debt and equity, including interest rates and dividend payments.
- (2) Risk: The level of financial risk a company is willing to take on, including the risk of default or bankruptcy.
- (3) Financial Flexibility: The ability to respond to changing market conditions and investment opportunities.
- (4) Taxation: The impact of taxes on debt and equity financing.

Net Operating Income Formula. (Theory Previous Page)

Proposition I Value of the firm.

$$V = EBIT / WACC$$

Where V = Value of the firm

EBIT - Earnings Before Interest and Taxes.

WACC - Weighted Average Cost of Capital
Proposition II Cost of Equity

$$K_e = K_u + (K_u + K_d) * (D/E)$$

Where K_e = cost of Equity

K_u = cost of capital for an unlevered firm

K_d = cost of debt

D/E = Debt to Equity Ratio.

Traditional Approach Formula.

$$WACC = (E/V * k_e) + (D/V * k_d * (1-T))$$

Where,

WACC = Weighted Average Cost of Capital

E = Market value of Equity

V = Total Market Value of the firm

k_e = Cost of Equity

D = Market value of Debt

k_d = Cost of debt

T = Tax Rate

Problem and Solution.

1) NI Approach:

A firm has a net income of ₹ 50,000 and a cost of equity of 12%. Calculate the value of the firm.

Sol.:

$$V = \frac{NI}{k_e}$$

$$\text{Net Income} = 50000$$

$$\text{cost of equity} = 12\%$$

$$\frac{12}{100} = 0.12$$

$$\text{value of the firm} = \frac{\text{Net Income}}{\text{cost of equity}}$$

$$= \frac{50000}{0.12}$$

$$= ₹ 4,16,667$$

2) A Company has a net Income of ₹ 1,50,000 and a Cost of Equity of 10%. Calculate the value of the company using the NI Approach.

$$V = NI / k_e \Rightarrow V = \frac{150000}{0.10}$$

$$NI = 150000$$

$$k_e = 10\% \Rightarrow 1500,000$$

3) Net Income = £ 1,00,000

Cost of Equity = 12%

Value of the firm = ?

Ans: 833,333

4) Net Income = 500,000

Cost of Equity = 15%

Value of the firm = ?

Ans: 3,333,333

5) Value of the firm = 2,000,000

Cost of Equity = 10%

Net Income =

Formula: Net Income = Value $\times$ Cost of Equity

$$= 2,000,000 \times 0.10$$

$$= 200,000$$

Net Operating Income Approach:

- 1) A company has a net operating income (NOI) of £ 200,000 and a Capitalization Rate of 8%. Calculate the value of the Company using the NOI approach.

$$\text{Value} = \text{NOI} / \text{Cap. Rate}$$

$$= 200,000 / 8\%$$

$$= 200,000 / 0.08$$

$$= 2,500,000$$

2) $NOI = ₹ 1,50,000$
 Cap. Rate = 9%
 Value = ?

$$\frac{1,50,000}{0.09}$$

$$= 1,666,667$$

3) $NOI = 300,000$
 Value = 3,000,000
 Capital Rate = ?

Sol

$$\text{Capital Rate} = \frac{NOI}{\text{Value}}$$

$$= \frac{300,000}{3,000,000}$$

$$= 0.10 \text{ (or) } 10\%$$

4) $NOI = ?$
 Value = ₹ 2,500,000
 Capital Rate = 8%

$$NOI = ?$$

$$NOI = \text{Value of the co.} \times \text{Cap. Rate}$$

$$= 2,500,000 \times 0.08$$

$$= ₹ 2,00,000 \text{ Ans.}$$

Modigliani Miller theory

$$\text{Value} = \frac{EBIT}{WACC}$$

- 1) A company has an EBIT of ₹ 5,00,000 and of WACC of 12%. Calculate the value of Company using the M&M Approach?

$$EBIT = 5,00,000 \quad WACC = 12\%$$

$$\text{Value} = \frac{EBIT}{WACC}$$

$$= \frac{5,00,000}{0.12}$$

$$= 4,166,667$$

Value of the company = ₹ 4,166,667

2) $EBIT = 200000$

$WACC = 10\%$

Value = ?

$$\text{Value} = \frac{EBIT}{WACC}$$

$$= \frac{200000}{0.10}$$

$$V = 2000,000$$

3)

$EBIT = 500000$

Value = 4,000,000

$WACC = ?$

$$WACC = EBIT / \text{value}$$

$$= 500000 / 4000000$$

$$= 0.125$$

$WACC = 12.5\%$

3) Value = 3,000,000

$WACC = 12\%$

$EBIT = ?$

$$EBIT = \text{value} \times WACC$$

$$= 3000000 \times 0.12$$

$$EBIT = 3,60,000$$

Traditional Approach

① The Company has the following details

Market value of Equity 6,00,000

Market value of debt 4,00,000

Cost of Equity 15%

Cost of debt 8%

Tax rate 25%

Calculate the weighted Average cost of Capital using the Traditional Approach.

$$WACC = (\text{Weight of equity} \times \text{Cost of equity}) + \text{Weight of debt} \times \text{Cost of debt} \times (1 - \text{tax rate})$$

$$\begin{aligned} \text{Weight of Equity} &= \frac{\text{Market Value of Equity}}{\text{Total Market Value}} \\ &= \frac{600000}{600000 + 400000} \quad 6\% \\ &= 0.6 \end{aligned}$$

$$\begin{aligned} \text{Weight of debt} &= \frac{\text{Market Value of debt}}{\text{Total Market Value}} \\ &= \frac{4,00,000}{(6,00,000 + 4,00,000)} \\ &= 0.4 \end{aligned}$$

$$WACC = (E/V \times k_e) + (D/V \times k_d) \times (1 - \text{Tax Rate})$$

$$= (\text{Weight of Equity} \times \text{Cost of Equity}) + (\text{Weight of debt} \times \text{Cost of debt}) \times (1 - \text{Tax Rate})$$

$$= (0.6 \times 0.15) + (0.4 \times 0.08) \times (1 - 0.25)$$

$$= 0.09 + 0.024$$

$$= 0.114 \text{ (or) } 11.4\% \quad 0.114$$

$$WACC = 11.4\% \text{ Ans//}$$

2) Market value of Equity = ₹ 8,00,000

Market value of debt = ₹ 2,00,000

Cost of Equity = 12% Cost of debt = 6%

Tax Rate = 20% WACC = ?

Sol:

$$WACC = (E/V \times k_e) + (D/V \times k_d) \times (1 - \text{Tax Rate})$$

$$\text{Weight of Equity} = \frac{\text{Market Value of Equity}}{\text{Total Market Value}}$$

$$= \frac{8,00,000}{(8,00,000 + 2,00,000)} = 0.8$$

$$\text{Weight of debt} = \frac{\text{Market value of debt}}{\text{Total Market value}}$$

$$= \frac{2,000,000}{1,000,000 + 8,000,000}$$

$$WACC = \frac{(0.8 \times 0.12) + (0.2 \times 0.06 \times (1 - 0.20))}{1}$$

$$= (0.096) + (0.0096)$$

$$= 0.096 + 0.0096$$

$$= 0.1056 \times 100\%$$

$$= 10.56\%$$

- 2) WACC = 10% Market Value of Equity = 5,000,000
 Market Value of debt = 3,000,000
 Cost of Equity = 15% Tax Rate = 25%
 Cost of debt = ?

sol

$$0.10 = (0.625 \times 0.15) + (0.375 \times k_d \times (1 - 0.25))$$

$$0.10 = 0.09375 + 0.28125 \times k_d$$

$$0.00625 = 0.28125 \times k_d$$

$$k_d = \frac{0.00625}{0.28125}$$

$$k_d = 0.022222$$

- 3) H.W Market Value of Equity = 1,000,000
 Market Value of debt = 5,000,000
 Cost of Equity = 18% Tax Rate = 30%
 Cost of debt = 9% WACC = ?

Capital Structure

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Debt to Equity Ratio

- 1) A company has Total Debt = ₹ 4,00,000
Total Equity = ₹ 6,00,000. What is Debt-to-Equity Ratio?

$$\begin{aligned}\text{Debt to Equity Ratio} &= \frac{\text{Total Debt}}{\text{Total Equity}} \\ &= \frac{4,00,000}{6,00,000} \\ &= 0.67\end{aligned}$$

- 2) A company has Total Debt = ₹ 5,00,000
Total Equity ₹ 1,000,000. What is Debt to Equity Ratio?

$$\begin{aligned}\text{Debt to Equity Ratio} &= \frac{\text{Total Debt}}{\text{Total Equity}} \\ &= \frac{5,00,000}{1,000,000} = 0.5\end{aligned}$$

Debt More than Equity

- 1) Company B has Debt = ₹ 1,200,000
Equity = ₹ 8,00,000. Find the Debt Equity Ratio?

$$\text{Debt Equity Ratio} = \frac{1,200,000}{8,00,000} = 1.5$$

Find Missing Debt using Ratio

- 1) A company has Total Equity = ₹ 4,00,000
Debt to Equity Ratio = 0.75. Find the total Debt

Let Debt = D

$$\text{De Ratio} = \frac{D}{\text{Total Equity}} \Rightarrow 0.75 = \frac{D}{4,00,000}$$

$$D = 4,00,000 \times 0.75 = ₹ 3,00,000$$

Find Equity Given Ratio and Debt

A business has Total Debt = 3,60,000

Debt to Equity = 0.6. What is the Equity?

Sol:

$$\text{Let Equity} = E = \frac{\text{Total Debt}}{\text{Total Equity}}$$

$$0.6 = \frac{3,60,000}{E}$$

$$E = \frac{360,000}{0.6}$$

$$\text{Equity} = E = 6,00,000$$

Convert into Percentage.

Company has Debt = 25,0000.

Equity = 7,50,000. What is the Debt to Equity Ratio in Percentage

Sol

$$\frac{\text{Total Debt}}{\text{Total Equity}}$$

$$= \frac{2,50,000}{7,50,000}$$

$$= 0.3333$$

$$\times 100$$

$$\text{Debt to Equity Ratio} = 33.33\%$$

Calculate the weighted Average Cost of Capital (WACC)

1) A company has Debt = 2,00,000

Equity ₹ 8,00,000 Cost of debt (after tax) = 5%

Cost of Equity = 10%

$$WACC = \left(\frac{D}{D+E} \times r_d \times (1-T) \right) + \left(\frac{E}{D+E} \times r_e \right)$$

D = Debt E = Equity

r_d = Cost of debt (after-tax) =

r_e = Cost of Equity

T = Tax Rate

$D = 2,00,000$ $E = 8,00,000$ $r_d = 5\%$ $r_e = 10\%$

$$WACC = \left(\frac{2,00,000}{1,00,000} \times 5\% \right) + \left(\frac{8,00,000}{1,00,000} \times 10\% \right)$$

$$= 0.01 + 0.08$$

$$= 0.09$$

Convert into %

$$0.09 \times 100$$

$$WACC = 9\% \text{ Ans}$$

Note: Tax Rate NA in this Sum.

2) Debt = ₹ 2,00,000 Equity = ₹ 3,00,000

Cost of debt = 6% Cost of Equity = 10%

Tax Rate = 30%

Total Capital = Total Debt + Total Equity

$$= 2,00,000 + 3,00,000$$

$$= 5,00,000$$

After Tax cost

$$WACC = \left(\frac{D}{D+E} \times r_d \times (1-T) \right) + \left(\frac{E}{D+E} \times r_e \right)$$

$$\Rightarrow \left(\frac{2,00,000}{5,00,000} \times 6\% \times (1-30\%) \right) + \left(\frac{3,00,000}{5,00,000} \times 10\% \right)$$

$$= \left(0.4 \times 0.042 \right) + \left(0.6 \times 0.10 \right)$$

$$= 0.0168 + 0.06 = 0.0768$$

Convert into Percentage $\times 100$
WACC = 7.68%

No Pire

Debt = ₹ 1,00,000 Equity = 4,00,000

Cost of debt = 5%. Cost of Equity = 12%

Tax Rate = 0%

$$WACC = \left(\frac{D}{D+E} \times r_d \times (1-T) \right) + \left(\frac{E}{D+E} \times r_e \right)$$

$$= \left(\frac{1,00,000}{1,00,000 + 4,00,000} \times 5\% \times (1-0) \right) + \left(\frac{4,00,000}{1,00,000 + 4,00,000} \times 12\% \right)$$

$$= (0.2 \times 5\%) + (0.8 \times 12\%)$$

$$= (0.2 \times 0.05) + (0.8 \times 0.12)$$

$$= (0.01 + 0.096)$$

$$= 0.106$$

Convert into Percentage (x100)

$$WACC = 0.106 \times 100 = 10.6\%$$

Find the Cost of Equity (using known WACC)

1) A firm has Debt ₹. 2,50,000

Equity = 7,50,000 Cost of debt = 6%

Tax Rate = 25% WACC = 9%

Find cost of Equity (r_e)

$$WACC = \left(\frac{D}{D+E} \times r_d \times (1-T) \right) + \left(\frac{E}{D+E} \times r_e \right)$$

$D = \text{Cost of Debt}$ $E = \text{Cost of Equity}$
 $r_e = \text{cost of equity}$ $r_d = \text{cost of debt}$

$$9\% = \left(\frac{8,50,000}{250,000 + 750,000} \times 6\% \times (1 - 25\%) \right) + \left(\frac{750,000}{250,000 + 750,000} \times r_e \right)$$

$$0.09 = \left(0.25 \times 0.06 \times 0.75 \right) + \left(0.75 \times r_e \right)$$

$$0.09 = 0.01125 + 0.75 r_e$$

$$0.09 - 0.01125 = 0.75 r_e$$

$$0.75 r_e = 0.07875$$

$$r_e = \frac{0.07875}{0.75}$$

$$r_e = 0.105$$

$$r_e = 0.105 \times 100$$

$$r_e = 10.5\%$$

$$\text{Cost of Equity} = 10.5\%$$

Find WACC when Equity is Higher Proportion
 A Company has Equity = ₹ 9,00,000
 Debt = 1,00,000 Cost of Equity = 11%
 Cost of Debt = 7% Tax Rate = 35%

$$WACC = \left(\frac{D}{D+E} \times r_d \times (1-T) \right) + \left(\frac{E}{D+E} \times r_e \right)$$

$$\Rightarrow \left(\frac{1,00,000}{1,00,000 + 9,00,000} \times 0.07 \times (1 - 0.35) \right) + \left(\frac{9,00,000}{1,00,000 + 9,00,000} \times 0.11 \right)$$

$$\left(\frac{1,00,000}{1,000,000} \times 0.045 \right) + \left(\frac{9,00,000}{1,000,000} \times 0.11 \right)$$

$$= (0.1 \times 0.045) + (0.9 \times 0.11)$$

$$= 0.0045 + 0.099$$

$$= 0.1035$$

Convert into Percentage (Multiplied by 100)

$$WACC = \underline{\underline{10.35\%}}$$

Basic Degree of Operating Leverage

Formulas:

Step 1

Calculation of Contribution of Margin Per unit

$$\text{CM per unit} = \text{Selling price} - \text{Variable cost per unit}$$

Step 2

Calculation of Total Contribution Margin

$$\text{Total contribution Margin} = \text{CM per Unit} \times \text{Units Sold}$$

Step 3:

Calculation of Operating Income (EBIT)

$$\text{Operating Income (EBIT)} = \text{Total Contribution Margin} - \text{Fixed Costs}$$

A company sells a product for ₹ 100 per unit. The variable cost per unit ₹ 60 and the fixed cost are ₹ 2,00,000. The company sold 50,000 units in a given period. Calculate the degree of operating leverage at 50,000 units.

Step 1

Calculation of CM per unit.

$$\begin{aligned} \text{CM PU} &= \text{SP} - \text{VC} \\ &= 100 - 60 \\ &= 40 \end{aligned}$$

Step 2

Total Contribution Margin

$$\begin{aligned} \text{TCM} &= \text{CM per unit} \times \text{unit sold} \\ &= 40 \times 50,000 \text{ units} \\ &= 2,000,000 \end{aligned}$$

Step 3. Calculation of operating Income (EBIT)

Operating Income EBIT = Total Contribution - Fixed cost

$$\begin{aligned} \text{EBIT} &= 2,000,000 - 2,00,000 \\ &= 1,800,000 \end{aligned}$$

Step 4

Degree of operating Income
total contribution Margin

$$\begin{aligned} \text{DOL} &= \frac{\text{Operating Income}}{\text{Operating Income}} \\ &= \frac{2,000,000}{1,800,000} \\ &= 1.11 \end{aligned}$$

Degree of operating leverage (DOL) at 50,000 units is 1.11.

II Degree of Operating Leverage (DOL) With change in Sales.

- 9) A company sales has fixed cost ₹ 1,50,000 and a Contribution Margin of ₹ 5,00,000. The company sold ₹ 30,000 units at ₹ 80 Per unit. The Company expects a 10% increase in Sales.

Calculate the Degree of Operating Leverage (DOL) -

If sales increases by 10%. What is the expected change in Operating Income?

Step 1 Calculate Operating Income (EBIT)

$$EBIT = \text{Contribution Margin} - \text{Fixed costs}$$

Step 2 Calculation of the Degree of Operating Leverage (DOL)

$$DOL = \frac{\text{Contribution Margin}}{\text{Operating Income}}$$

Step 3: Estimate the Expected change in operating Income.

$$\left. \begin{array}{l} \text{Change in} \\ \text{Operating Income} \end{array} \right\} = DOL \times \text{Percentage Change in Sales}$$

Step 1

$$EBIT = CM - FC$$

$$= 5,00,000 - 1,50,000$$

$$= 3,50,000$$

Step 2 $DOL = \frac{CM}{EBIT}$

$$= \frac{5,00,000}{3,50,000} = 1.43$$

Step 3.

$$\frac{\text{Change in Operating Income}}{\text{Change in Sales}} = DOL \times \text{Percentage}$$

$$= 1.43 \times 10\%$$

$$= 14.3\%$$

Ans: So the Degree of Operating Leverage (DOL) is 1.43 and the operating income is expected to increase by 14.3% if sales increase by 10%.

iii) Impact of Declining Sales on Operating Income
A company has Fixed Cost of ₹ 3,00,000 and a Contribution Margin of ₹ 1,00,000. The Company sells 50,000 units at 60 per unit. The company expects a 5% decrease in sales. Calculate DOL, if sales decrease by 5%. What is the Expected decrease in Operating Income?

Step 1 : (1) calculation of Operating Income (EBIT)
 $EBIT = CM - FC$

Step 2 : Calculate DOL

$$DOL = \frac{CM}{EBIT}$$

Step 3 : Estimate the Expected Change

$$\frac{\text{Change in Operating Income}}{\text{Change in Sales}} = DOL \times \text{percentage change in Sales}$$

Step 1 $EBIT = 1,000,000 - 3,00,000$
 $= 700,000$

Step 2 $DOL = \frac{1,000,000}{700,000}$
 $= 1.43$

Step 3 Change in operating income
 $= 1.43 \times (-5\%)$
 $= -7.15\%$

Sol: Degree of Operating Leverage (DOL) is 1.43 and Operating Income is expected to decrease by 7.15% if sales decreases by 5%.

Operating Leverage

Operating leverage refers to the proportion of fixed cost in a company's cost structure.

Financial Leverage

Financial leverage refers to the using debt to finance a company's assets.

Financial Leverage

$$FL = \frac{\text{Total Assets}}{\text{Equity}}$$

①. A company has the following financial information: Total Assets = ₹ 2,00,000
 Equity = 1,20,000 Calculate Financial Leverage.

$$\text{Financial Leverage} = \frac{\text{Total Assets}}{\text{Equity}}$$

$$= \frac{2,000,000}{1,200,000}$$

$$= 1.67$$

Degree of Financial Leverage (DFL)

Step 1

Calculation of Earnings before Taxes (EBT)

$$EBT = EBIT - \text{Interest Expense}$$

Step 2

Calculate Earnings Per Share (EPS)

$$EPS = \frac{EBT}{\text{Shares Outstanding}}$$

Step 3

Degree of Financial Leverage (DFL)

$$DFL = \frac{\text{Percentage Change in EPS}}{\text{Percentage Change in EBIT}}$$

$$\text{(or)} \frac{EBT}{EBT - \text{Interest Expense}}$$

A company has the following data

EBIT (Operating Income) 3,00,000

Interest Expenses 50,000

Shares Outstanding 1,00,000

Stock ₹ 20 per share

Step 1

$$EBT = EBIT - \text{Interest Expense}$$

$$= 3,00,000 - 50,000$$

$$EBT = 2,50,000$$

Step 2 :

$$\begin{aligned}\text{EPS} &= \frac{\text{EBT}}{\text{Shares Outstanding}} \\ &= \frac{2,50,000}{1,00,000}\end{aligned}$$

$$= 2.50$$

Step 3 :

$$\begin{aligned}\text{DFL} &= \frac{\text{EBIT}}{\text{EBT}} \\ &= \frac{3,00,000}{2,50,000}\end{aligned}$$

$$= 1.20$$

Sol : The Degree of Financial Coverage at the current level of EBIT is 1.20. This means that a 1% change in EBIT will result in a 1.20% change in EPS.