Capital Structure Decision and Value of the Firm

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Theories of capital structure

- NI approach
- NOI approach
- Traditional Approach
- Modigliani and Miller Approach

CAPITAL STRUCTURE DECISIONS

CAPITAL STRUCTURE refers to Proportion of each of the sources of fund in the capital. It includes equity, preference, reserves, retained earnings, long term debts etc.

FACTORS AFFECTING DECISION

- Financial Flexibility
- Tax Flexibility
- Business Risk
- Nature of Industry
- Operating Cash Flow
- Management Style

IDEAL CAPITAL STRUCTURE

It should be such that it should :

- Minimize Cost of Capital
- Reduce Business Risk
- Provide Flexibility
- Provides Control
- Maximize value of the firm

TIPS TO GET DECISION RIGHT

- Evaluation of the company's need of capital.
- Liquidity to be prepared on "What if" Scenario.
- Understand the credit rating to guarantee payment.
- Develop a clearly defined decision making framework.

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Capital structure decision

What is capital structure?

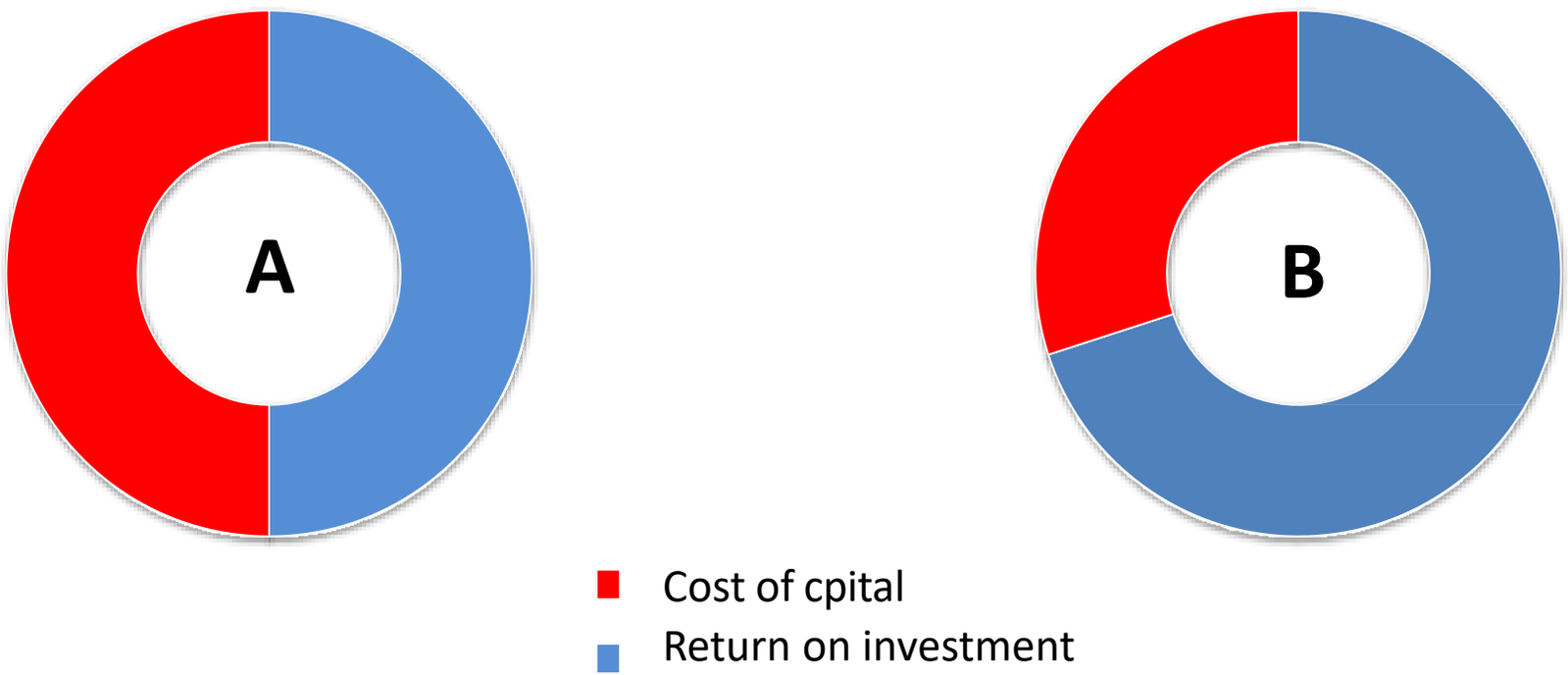
Combination of various component of capital is called capital structure. The over all cost of capital may reduce as the proportion of debt increases in the capital structure because cost of debt is less than cost of equity, while on the other hand risk of the firm increases with the increase in the fixed contractual obligation, which again increases the weighted average cost of capital.

The firm may use only equity, or only debt, or a combination of equity +debt, or a combination of equity + debt + preference shares or may use other similar combinations to form capital structure.

Ideal capital structure

- It minimize cost of capital.
- It reduce risks.
- It give required flexibility.
- It provide required control to the owners.
- It enable the company to have adequate finance.
- It maximize the value of the firm ultimately the wealth of the shareholders.

Total Return and Cost of Capital



Which company has more value?

Example

Total capital needed for a company is Rs. 2000.

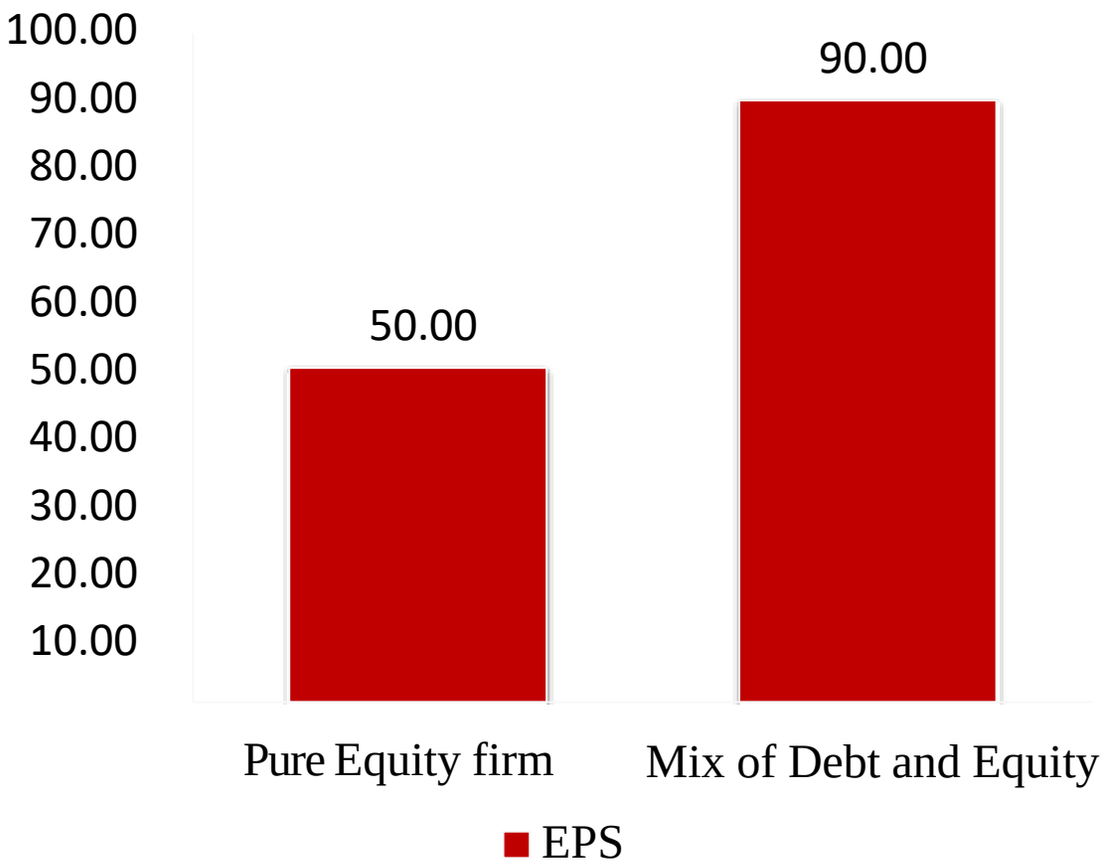
Company has 2 options

1) Issue 20 Equity shares of Rs. 100
2) Issue 10 Equity shares of Rs. 100 and 10% Debt for Rs. 1000.

Assume that total return earned in both is Rs.1000.

Calculate the return for shareholders (EPS)

Earning per share for same profile with different capital structure



It means when capital structure is changing the cost of capital will change and also it will effect the value of the firm

Capital Structure Theories

I. Net Income Approach (NI)
II. Net Operating Income Approach (NOI)
III. Traditional Approach
IV. Modigiliani – Miller Approach (MM Approach)

Net Income Approach (NI Approach)

- Suggested By David Durand in 1959.
- The earning of the firm after the payment of all other expenses except interest on debt is called Net Operating Income (NOI) and the earning available for equity shareholders after the payment of interest is called as “Net Income (NI).
- Therefore, Net Income = Net Operating Income (NOI) - Interest on debt (I).
- According to NI approach capital structure decision is relevant for the value of the firm.
- Change in the capital structure will corresponding bring change in the overall cost of capital

Contd

- According to this approach, “a high debt equity ratio in the capital structure (called financial leverage) will result in decline in the overall cost of capital (WACC) of the firm and increase value of firm.”
- According to NI Approach, change in the financial leverage (debt/equity ratio) of a firm will lead to a corresponding change in the WACC and also the value of the firm.
- The NI Approach suggests that with the increase in leverage (proportion of debt), the WACC decreases and the value of firm increases and vice versa.

Contd.

- Under NI approach, higher use of debt in capital structure will result in reduction of WACC. As a consequence, value of firm will be increased
- $\text{Value of firm} = \frac{\text{Earnings}}{\text{WACC}}$

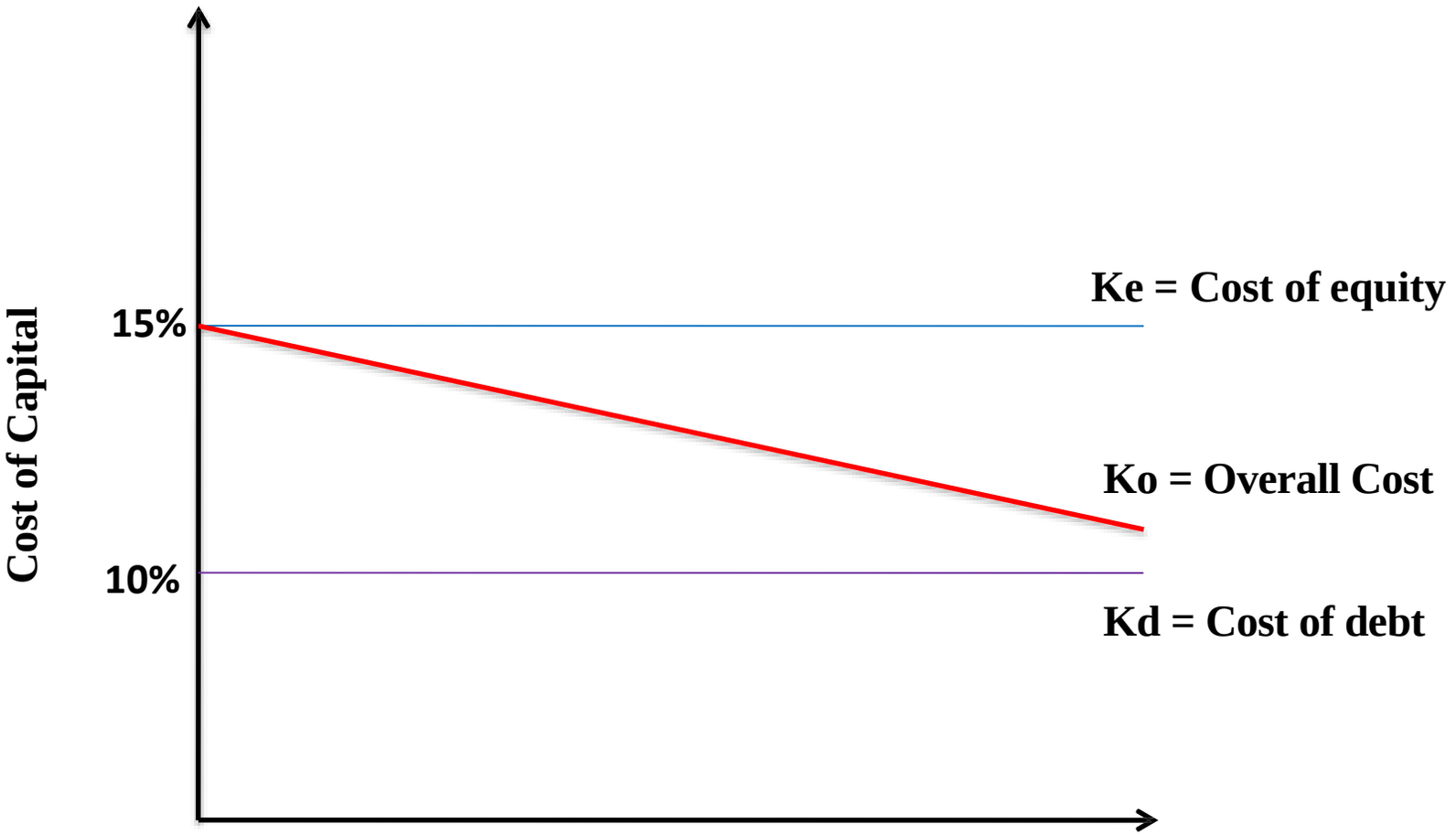
WACC = Weighted Average Cost of Capital

- Earnings (EBIT) being constant and WACC is reduced, the value of a firm will always increase.
- The capital structure is said to be optimum at that stage of debt-equity mix where the overall cost of capital is minimum. As per this approach the cost of capital is minimum at 100% level of debt, therefore the capital structure is optimized at the 100% debt level.

Assumptions

(i) There are no corporate taxes.
(ii) The cost of debt is less than the cost of equity ($K_d < K_e$) i.e. the capitalization rate of debt is less than the capitalization rate of equity. This prompts the firm to borrow.
(iii)The debt capitalization rate and the equity capitalization rate remain constant over the time.
(iv)The proportion of the debt does not affect the risk perception of the investors. Investors are only concerned with their desired return.
(v) The cost of debt remains constant at any level of debt.
(vi) Dividend pay out ratio is 100%.

Graphical representation of NI Approach



Formulas in NI Approach

Value Of The Firm(V) = S+B

S= Value of share

B = Value Of Debt

Market Value Of Equity $= \frac{\mathbf{NI}}{\mathbf{Ke}} \times 100$

NI = Net Income for E-Share holders

Ke = Cost of Equity

Case 1.

XYZ Ltd Earned a profit of Rs. 25 Lakhs before providing interest and tax. The company's capital structure is as follows

4,50,000 E/S of Rs. 10 each and its market capitalization rate is 16%

26,000 14% secured redeemable debentures of Rs. 150 each

You are required to calculate Value of firm by using NI Approach and Overall cost of capital of the firm.

Solution

NI = EBIT – Interest
S = NI/Ke * 100
B = No of Debt * Price
Value of firm = S+B
Overall Cost = EBIT / V

Profit Before Interest And Tax	2500000
Less Debt Interest (14%* 26000*150)	546000
Net Income available to E/S H	1954000
Value of Share at 16% capitalisation rate	12212500
Value of Debt at 14% capialisation rate	3900000
Total Value of the firm (S+B)	16112500
Overall cost of capital (WACC)	0.1552

Case 2.

- A company expects its annual EBIT to be Rs. 80,000. The company has 2,00,000 in 10% Debt and the Ke = 12.5%.
  - Calculate Value of firm and Overall cost of capital
  - If the company Increase the debt content to Rs. 3,00,000

  (Assume that there is no change in Profit)

Case 2 -Solution

Profit Before Interest And Tax	80000
Less Debt Interest (10%* 200,000)	20000
Net Income available to E/S H	60000
Value of Share at 12.5% capitalisation rate	480000
Value of Debt at 10% capialisation rate	200000
Total Value of the firm (S+B)	680000
Overall cost of capital (WACC)	0.1176

NI = EBIT – Interest
S = NI/Ke * 100
B = No of Debt * Price
Value of firm = S+B
Overall Cost = EBIT / V

Case 2 - Solution Cotd..

Value of Share at 12.5% capitalisation rate	480000
Value of Debt at 10% capialisation rate	200000
Total Value of the firm (S+B)	680000
Overall cost of capital (WACC)	0.1176
Profit Before Interest And Tax	80000
Less Debt Interest (10%* 300,000)	30000
Net Income available to E/S H	50000
Value of Share at 12.5% capitalisation rate	400000
Value of Debt at 10% capialisation rate	300000
Total Value of the firm (S+B)	700000
Overall cost of capital (WACC)	0.1143

NI = EBIT – Interest

S = NI/Ke * 100

B = No of Debt * Price

Value of firm = S+B

Overall Cost = EBIT / V

Case 3.

Calculate the value of Firm and WACC for the following capital structures

EBIT of a firm Rs. 3,00,000	Ke = 10%	Kd = 6%
Case 1 Debt capital Rs. 500,000	Case 2 Debt = Rs. 800,000	Case 3 Debt = Rs. 200,000

Case 3 - Solution

NI = EBIT – Interest
S = NI/Ke * 100
B = No of Debt * Price
Value of firm = S+B
Overall Cost = EBIT / V

Particulars	Case 3.1	Case3.2	Case 3.3
Total Debt used by Firm	500000	800000	200000
Profit Before Interest And Tax	200000	200000	200000
Less Debt Interest at 6%	30000	48000	12000
Net Income available to E/S H	170000	152000	188000
Value of Share at 10% capitalisation rate	1700000	1520000	1880000
Value of Debt at 6% capialisation rate	500000	800000	200000
Total Value of the firm (S+B)	2200000	2320000	2080000
Overall cost of capital (WACC)	**0.0909**	**0.0862**	**0.0962**
Under NI approach when firm is using maximum debt its WACC is minimum and total value of the firm is maximum.			

2. Net Operating Income Approach (NOI Approach)

This theory is just opposite to NI approach. NI approach is relevant to capital structure decision. It means decision of debt equity mix does affect the WACC and value of the firm. As per NOI approach the capital structure decision is irrelevant and the degree of financial leverage does not affect the WACC and market value of the firm. NOI approach evaluates the cost of capital and therefore the optimal Capital Structure on the basis of operating leverage by means of NOI approach.

The NOI approach is based on following assumptions:

(i) There are no corporate taxes.

(ii) Cost of debt remains constant at all level of debt.

(iii) Overall cost of capital remains constant.

(iv) Value of the firm depends on expected net operating income and overall capitalization rate or the opportunity cost of capital.

(v) Net operating income of the firm is not affected by the degree of financial leverage.

(vi) The operating risk or business risk does not change with the change in debt equity mix.

(vii) WACC does not change with the change in financial leverage

Formulas in NOI Approach

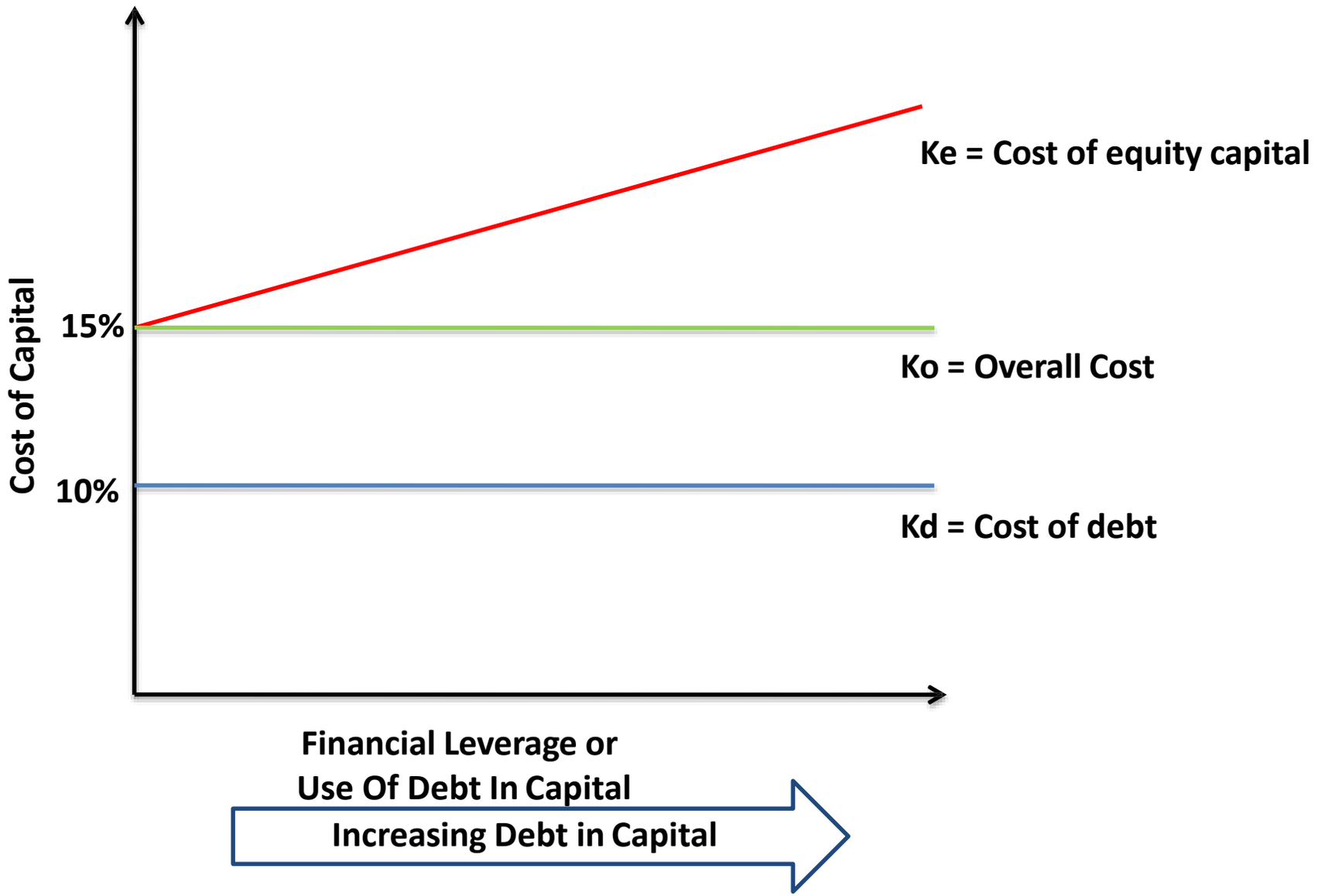
Value Of The Firm(V) = $\frac{\text{EBIT}}{\text{Ko}} \times 100$

EBIT = Earnings Before Int. & Tax
Ko = Overall Cost of Capital

Market Value Of Equity (S) = V - B

V = Value of Firm
B = Value of Debt

Graphical representation of NOI Approach



Case 4

The XYZ Ltd. has earned a profit before interest and tax Rs. 7 lakhs. The company's capital structure includes

30,000 14% Debenture of Rs. 100 each. The overall capitalization rate of the firm is 16%.

– Calculate the Total value of firm and the equity capitalization rate?

Case 4 - Solution

V = EBIT/Ko*100
S = V-B
Ke = EBIT-I / S*100

Particular	**Amount**
Profit before interest and tax (EBIT)	700000
Overal cost of capital 16%	0.16
Total Value of the firm (EBIT/overall cost of capital)	4375000
Total Value of the debt (No. of bonds x price)	3000000
Total value of equity (Total value of firm-Total value of debt)	1375000
Interest paid	420000
Earnings available to shareholders	280000
Cost of equity Ke	**0.2036**

Case 5

- A company expects a net operating income of 100000. it has Rs.5,00,000 6% Debentures. The overall capitalization rate is 10%.

  a. Calculate the value of the firm and the equity capitlization rate (Cost of equity) according to the Net Operating Income Approach.
  b. If the debenture debt is increased to Rs.700000 what will be the effect on the value of the firm?
  c. If the debenture debt is decreased to Rs. 300000 what will be the effect on the value of the firm?

V = EBIT/Ko*100
S = V-B
Ke = EBIT-I / S*100

Case5- Solution

	When debt is 500000	**When debt is 700000**	**When debt is 300000**
Particular	Amount	Amount	Amount
Profit before interest and tax (EBIT)	100000	100000	100000
Overal cost of capital 10%	0.1	0.1	0.1
Total Value of the firm (EBIT/overall cost of capital)	1000000	1000000	1000000
Total Value of the debt (No. of bonds x price)	500000	700000	300000
Total value of equity (Total value of firm-Total value of debt)	500000	300000	700000
Interest paid at 6%	30000	42000	18000
Earnings available to shareholders	70000	58000	82000
Cost of equity (Ke)	**0.14**	**0.1933**	**0.1171**

Optimum capital structure under NOI Approach:

As per NOI approach the cost of debt, market value of the firm and the market value of the equity shares remain constant irrespective of change in the financial leverage and the benefit of low cost of debt is offset by the increased rate of return on equity with the increase in debt in the capital structure.

Therefore, the overall all cost of capital remains the same at any level of debt; hence, the capital structure is optimum at any level of debt-equity mix.

Under this circumstances, the optimum level of capital structure composed on debt-equity composition becomes indeterminate, as the impact of financial leverage is counter balanced by a corresponding change in Ke in the opposite direction.

Traditional Approach

Traditional Approach

The traditional approach was propounded by Ezra Soloman in 1963 . This approach is the compromise between NI approach and NOI approach. The traditional approach rejects both extreme prepositions of relevance approach of NI theory and irrelevance approach of NOI theory. This approach neither assumes constant cost of equity (ke) and declining Weighted Average Cost of Capital (WACC) like NI approach nor increasing cost of equity and constant cost of debt (kd) and over all cost of capital (ko) like NOI approach.

Under traditional approach wacc decreases only up to a certain level of financial leverage and starts increasing beyond this level. At the judicious mix of debt and equity as of optimum capital structure weighted average cost of capital is minimum and the market value of the firm is maximum.

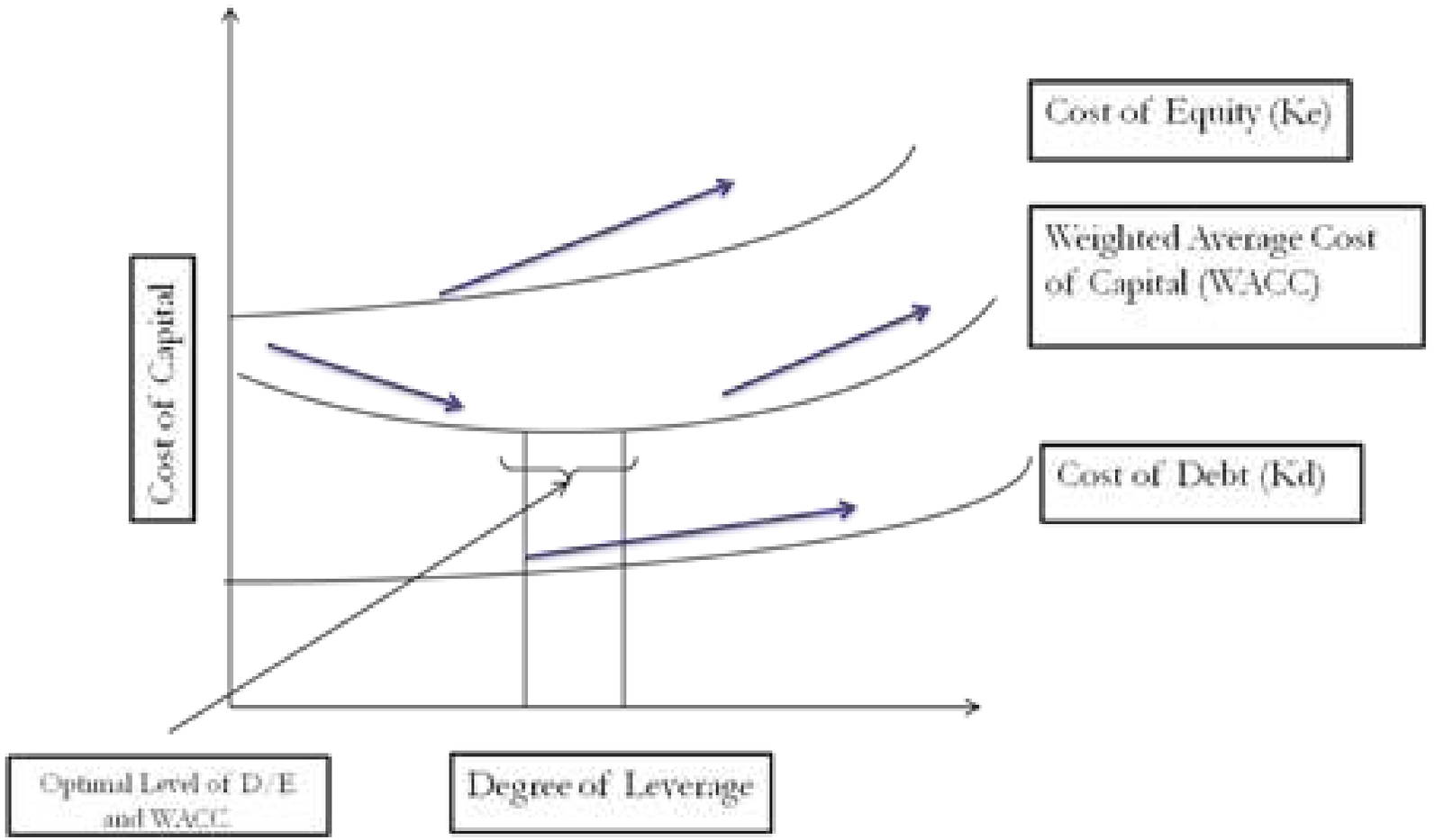
Three stage of capital structure under traditional approach

Stage 1:
The value of the firm may first increase with moderate leverage when WACC is decreasing.
Stage 2:
Reach the maximum value when WACC is minimum.
Stage 3:
Then starts declining with higher financial leverage when WACC start increasing.

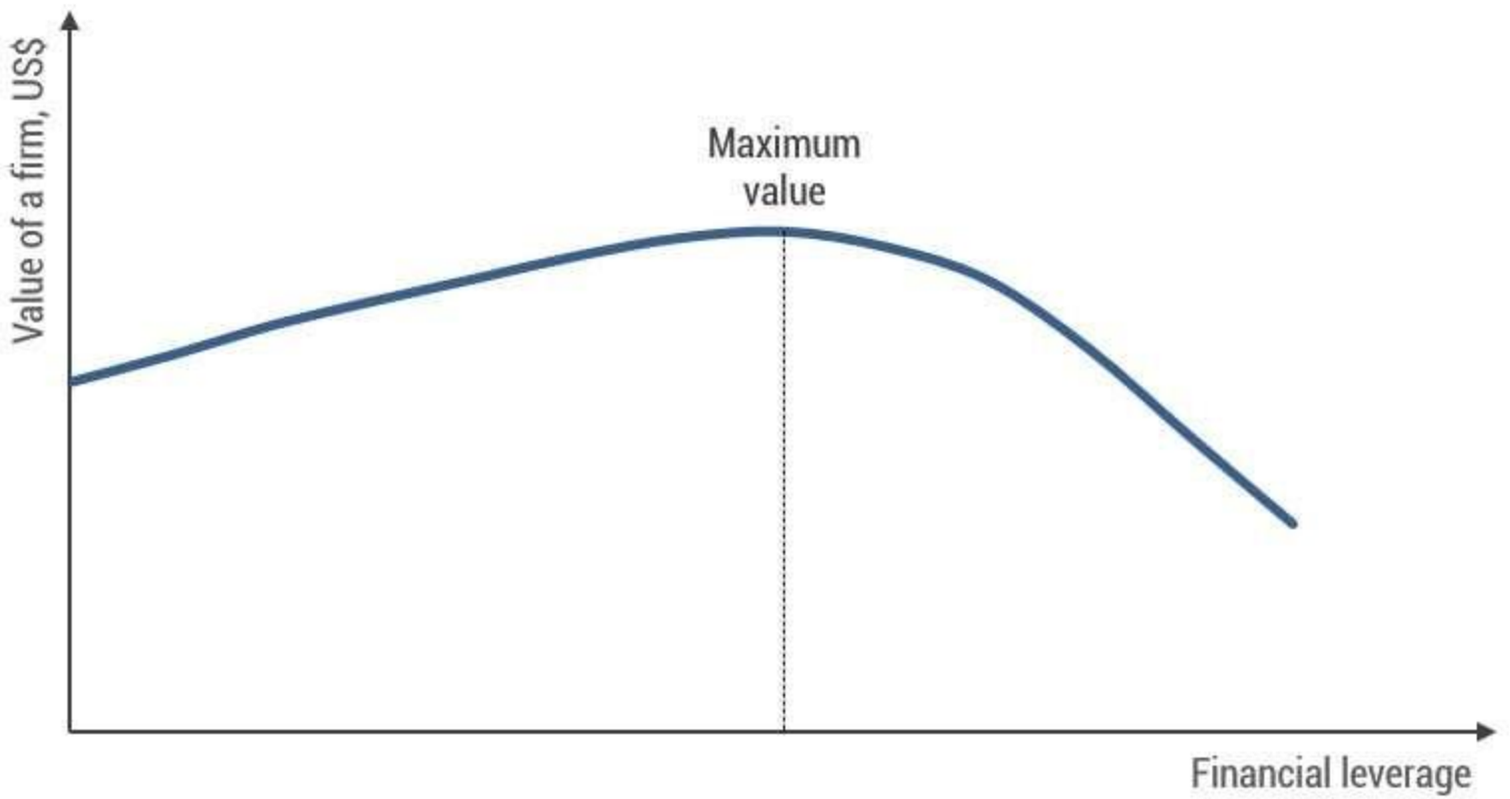
Assumptions Under Traditional Approach

- Cost of debt (k_d) remains stable with an increase in the debt ratio to a certain limit after which it begins to grow.
- Cost of equity (k_e) remains stable or grows slightly with an increase in the debt ratio to a certain limit after which it begins to grow rapidly.
- Weighted average cost of capital decreases to some degree with an increase in the debt ratio and then begins to grow.
- Cost of equity is larger than the cost of debt at any capital structure, i.e., $k_e > k_d$ at any value of debt ratio.

Traditional Approach – Graphical representation



Traditional Approach – Graphical representation (Mkt Value)



Case 6:

In considering the most desirable capital for a company the following estimates of the cost of debt and equity (after tax) have been made at a various level of debt equity mix.

Use of Debt as a percentage in total capital	Cost of Debt	Cost of equity
00	6.0	10.0
10	6.0	10.0
20	6.0	10.0
30	6.0	10.0
40	6.0	16.0
50	9.0	20.0
60	10.0	24.0

You are required to calculate optimal debt equity for the company by calculating composite cost of capital (Overall Cost of capital)

Case 6: Solution

Percentage debt in total capital	Cost of debt in %	Cosy of equity in %	WACC (Or Total cost of capital)
0	6	10	10
10	6	10	9.6
20	6	10	9.2
30	**6**	**10**	**8.8**
40	6	16	12
50	9	20	14.5
60	10	24	15.6

From the Table it is visible that at 30% level of debt WAAC reach its minimum point after that it start increasing. So the optimum capital structure is 30% debt and 70% equity. After this WACC start increasing causes decreases in overall value of the firm.

Formulas in Traditional Approach

Value Of The Firm(V) = Db + Eq

Db = Mkt value of debt
Eq = Mkt value of Equity

Market Value Of Equity (Eq) = $\frac{\text{EBT}}{\text{Ke}}$

EBT = EBIT - Interest
Ke = Cost of equity

WACC (Ko) = $\frac{\text{EBIT}}{\text{V}} \times 100$

EBIT = Earning B Int. Tax
V = Value of firm

Case 7:

- EBIT = Rs. 200,000
- Presently 100% equity finance with Ke = 16%.
- Introduction of debt to the extent of Rs. 300,000 @ 10% interest rate or Rs. 500,000 @ 12%.
- For case I, Ke = 18% and for case II, Ke = 21%. Find the value of firm and the WACC

Calculate Value of firm, total value of equity and WACC

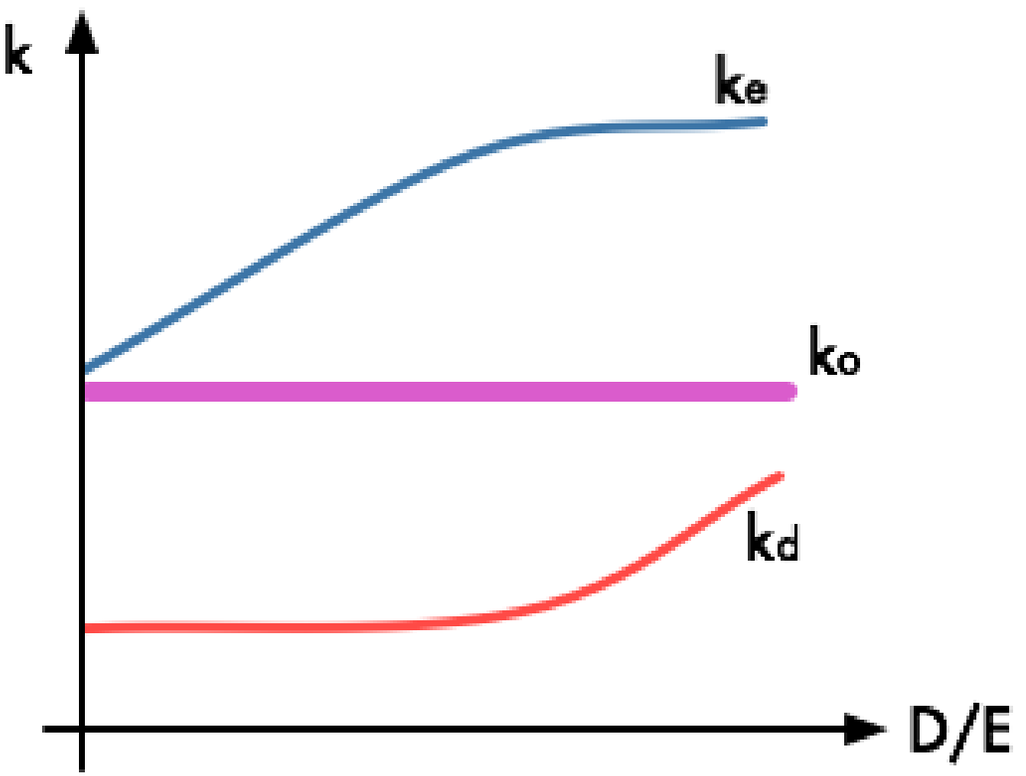
Case7: Solution

Particulars	At Present	case I	case II
EBIT	200000	200000	200000
Debt component	0	300000	500000
Rate of interest	0	10%	12%
(-) Interest	------	30,000	60,000
EBT	200000	170000	140,000
Cost of equity (Ke)	16%	17%	21%
Value of Equity (EBT / Ke)	1250000.0	1000000.0	666666.7
Total Value of Firm (Db + Eq)	1250000.0	1300000.0	1166666.7
WACC (EBIT / Value) * 100	16%	15%	17%

Modigliani – Miller Model (MM)

Modigliani – Miller Model (MM)

According to MM Approach cost of capital is independent of capital structure and financial leverage does not affect the overall cost of capital and hence there is no optimum capital structure. MM theory is just similar to NOI approach with a basic difference. The basic difference is that the NOI approach is purely abased on definitional term, explaining the concept without behavioral justification, whereas M.M. Approach provides behavioral justification in favor of the theory.



Assumptions – MM Approach

M.M. Approach is based on certain assumptions, as under.

i) Capital markets are perfect where individuals and companies can borrow unlimited funds at the same rate of interest.
ii) Stock markets are perfectly competitive.
iii) There is no corporate tax
iv) There is no transaction cost.
v) Investors are free to buy and sell securities.
vi) Investors behave rationally.
vii) Dividend payout ratio is 100% and there are no retained earnings.

- MM Model proposition

  - Value of a firm is independent of the capital structure.
  - Value of firm is equal to the capitalized value of operating income (i.e. EBIT) by the appropriate rate (i.e. WACC).
  - Value of Firm = **Mkt. Value of Equity + Mkt. Value of Debt**

    = Expected EBIT / Expected WACC

- MM Model proposition –
  - As per MM, identical firms (except capital structure) will have the same level of earnings.
  - As per MM approach, if market values of identical firms are different, '**arbitrage process***' will take place the difference will mitigate.*
  - In the **'arbitrage process'** investors will switch their securities between identical firms (from levered firms to un-levered firms) and receive the same returns from both firms.

Formulas in MM Approach

Value Of The Firm(V) = Db + Eq

Db = Mkt value of debt
Eq = Mkt value of Equity

Market Value Of Equity (Eq) = $\frac{\textbf{EBT}}{\textbf{Ke}}$

EBT = EBIT - Interest
Ke = Cost of equity

Case 8

There are 2 firms “A” and “B” having same earnings before interest and tax Rs. 20,000. Firm A is a levered company having a debt of Rs. 100,000 at 8% interest. The cost of equity for B Company is 10% and for A is 12%.

Find out Value of firm?

Case 8

Particulars	A	B
EBIT	20,000	20,000
Interest 100,000@8%	8,000	---------
EBT = (EBIT - interest)	12,000	20,000
Mkt. Value of Equity (EBT/Ke)	108,334	200,000
Value of Firm ((EBIT/Ko) or Ve+Vd)	208,334	200,000

Contd

Lets assume that a person hold 10% of shares in A Company (Levered) and receiving a return of 10% on his investment. Calculate his return?

- Total capital of A =208,334
- Equity Capital : 108,334
- 10% shares of 108,334 = 10833
- Return for him 10 % of EBIT after interest payment (10% of EBT).
- EBT of A = EBIT – I

  20000 – 8000 = 12000
- Return = 10 % 12000 = 1200

Case 8

- Let us assume that the investor will sell his existing shares of Rs. 10,833 and realized the same.
- Now, let him to borrow outside amount of Rs.10,000 @8%.
- In total he has 20833 (10833+10000). With this amount let him invest 10% in company B.
- Calculate his return?
- Value of Equity in B = 200,000
- 10% Investment = 20,000
- 10% Return = 2000

Case 8

But he has to pay the interest for his debt of 10000.

Interest @8% of 10,000 = 800.

Return he received is 2000 – 800

Net return 1200.

Same as the previous company.

Case 9

- XYZ Ltd intends to set up a project with capital cost of Rs. 50,00,000. Its considering the three alternative proposal of financing.
  - Alternative 1 = 100% Equity
  - Alternative 2 = Debt Equity 1:1
  - Alternative 3 = Debt Equity 2:1
- The estimated annual net cash inflow is @ 24% on the project. The rate of interest on debt is 15%.
- Calculate the WACC for three alternatives?

Particulars	Alternative 1	Alternative 2	Alternative 3
Equity	50,00,000	25,00,000	16,66,666
Debt component **(Db)**	00	25,00,000	33,33,334
Total Capital	**50,00,000**	**50,00,000**	**50,00,000**
Net cash inflow from project @ 24% **(EBIT)**	12,00.000	12,00.000	12,00.000
EBT **(EBIT- 15% Interest on debt)**	12,00.000 – 0 = 12,00,000	12,00.000 – 3,75,000 = 8,25,000	12,00.000 – 5,00,000 = 7,00,000
Return on equity **(EBT/ Total Equity*100)**	24%	33%	42%
Eq = EBT/Ke	5,000,000	2,500,000	12,50,000
V = Db + Eq	5,000,000	5,000,000	5,000,000
Return on debt	----	15%	15%
WACC = **(Ke x % of equity)+(Kd x % Debt)**	24%	24%	24%
V = EBIT / WACC			

Proposition 1

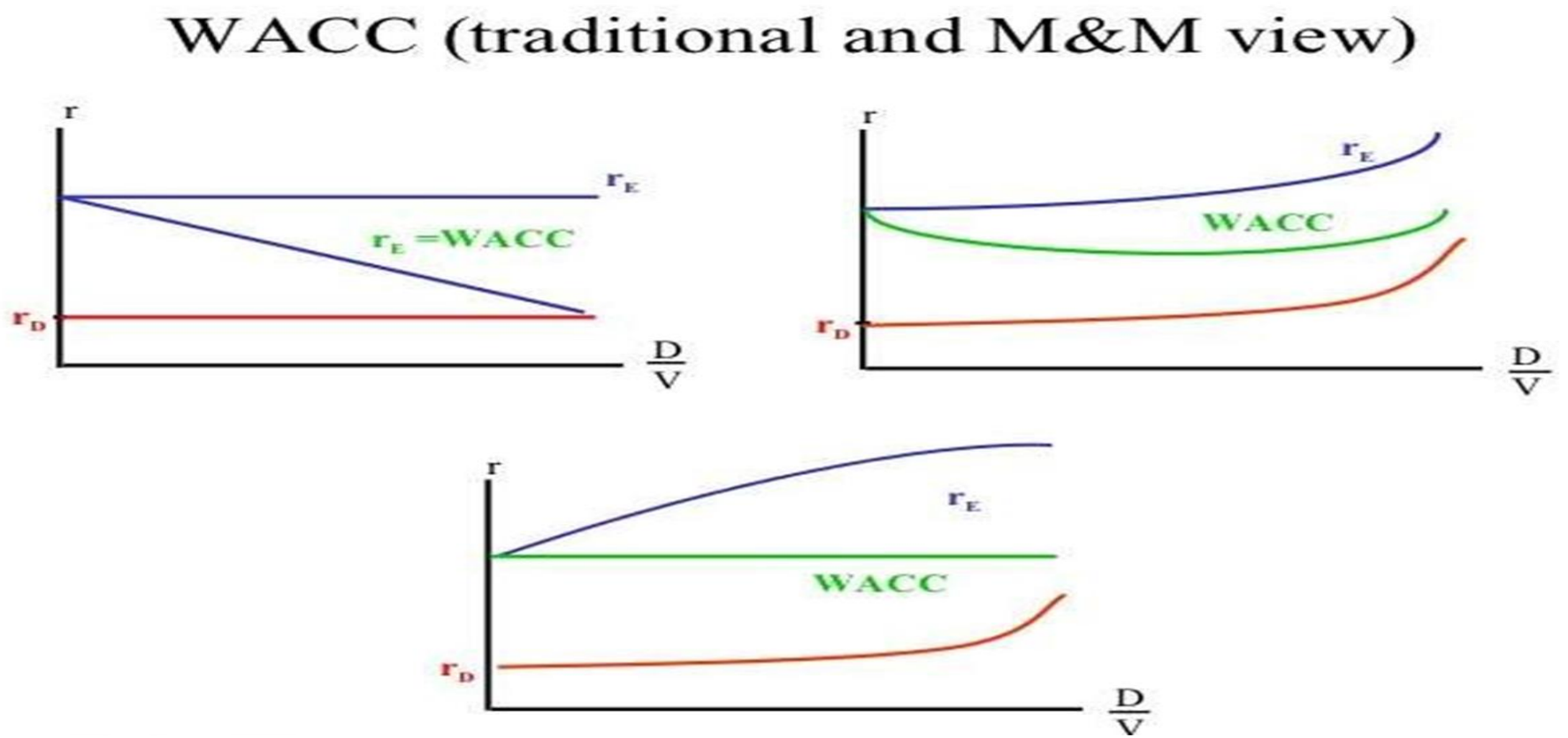
- Under the assumptions of “no taxes”, the capital structure does not influence the valuation of firm.
- In other words, leveraging no impact on the market value of the firm.
- All investors have same level of priority.

MM Approach: Propositions 2 With Taxes (The Trade-off Theory Of Leverage)

- The Modigliani and Miller Approach assumes that there are no taxes, but in the real world, this is far from the truth.
- Most countries, if not all, tax companies. This theory recognizes the tax benefits accrued by interest payments.
- Under corporate tax suggest that because of the tax deductibility of interest charges a firm can increase its value by using more and more financial leverage.
- Thus, the optimum capital structure is reached when 100% debt is used.
- However, they suggest that the firm should decide a target debt ratio because lenders impose their terms while lending more funds as debt, which creates many problems like possibility of financial distress, interference of moneylenders on dividend decision etc.

Value of levered firm = Value of unlevered firm + Present Value of tax shield - Present Value of financial distress.

VI = Vu + PVI NTS - PVFD



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