CAPITAL STRUCTURE THEORIES

INTRODUCTION

Capital structure decision is perhaps the most important strategic decision that has occupied much of attention. It is important for the survival and growth of the firm and it remains one of the most controversial subjects.

Capital structure refers to the proportion of debt and equity and finding out whether there is a capital structure that can be said optimal for the shareholders of the firm or not. It means that can the value of firm be enhanced by changing the mix of debt and equity? The question of capital structure deals with whether a firm must borrow money or not and, if yes, then to what extent. There is no definite answer available and there are conflicting theories about the existence of optimum capital structure.

Assumptions of Capital Structure Theories

The approaches of capital structure analyse the relationship between the leverage, the cost of capital and the value of the firm in different ways. Following assumptions are made to understand these relationships.

1. There are only two sources of funds i.e. debt and equity.
2. Total assets of the firm are given. The degree of leverage can be changed by selling debt to repurchase shares or selling shares to pay off debt.
3. There are no retained earnings. It implies that entire profits are distributed among shareholders.
4. The operating profit of firm is given and expected to grow.
5. The business risk is assumed to be constant and is not affected by the financing mix decisions.
6. There are no corporate or personal taxes.
7. The investors have the same subjective probability distribution of expected earnings.

Optimum Capital Structure

The capital structure is said to be optimum when the firm has selected such a combination of equity and debt so that following objectives are achieved.

a) Maximisation of shareholders' wealth
b) Minimisation of overall cost of capital (Ko) / WACC
c) Maximising the Market Value of the Firm

It is very difficult to find out optimum debt and equity mix where capital structure would be optimum because it is difficult to measure a fall in the market value of shares on account of increase in risk due to high debt content in capital structure. Hence, in practice, the expression 'appropriate capital structure' is more realistic than 'optimum capital structure'.

Each firm works towards achieving the appropriate capital structure. If it has a lower proportion of debt, it raises the debt to finance the investment opportunities. If the debt is too large, the firm raises equity capital.

Capital Structure Theories

Capital structure theories are divided in two sub-parts.

Capital Structure Relevance Theories

These theories are supporting the existence of an optimal capital structure. It includes two theories:

NET INCOME APPROACH

Net Income approach for capital structure focuses on the cash flows to the respective suppliers of capital and their capitalization rates.

The Net Income approach is the relationship between leverage and cost of capital and value of the firm. This theory states that there is a relationship between capital structure and value of the firm. Therefore, the firm can affect its value by increasing or decreasing the debt proportion in the overall financing mix. The NI approach makes following assumptions:

The total capital requirement of the firm is given and remains constant.

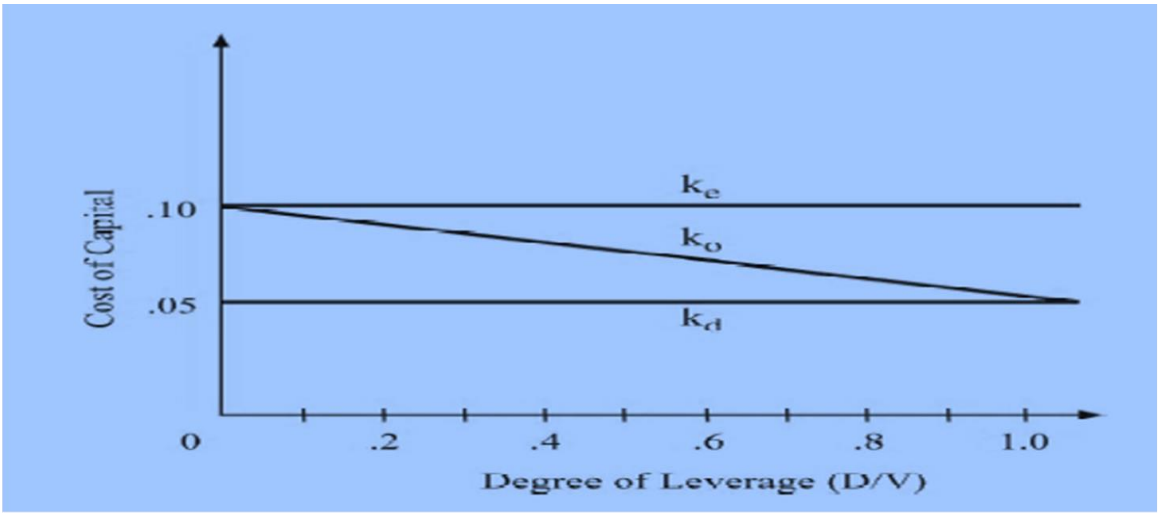
The cost of debt is less than cost of equity capitalization rate.

There are no corporate taxes.

Both debt capitalization rate and equity capitalization rate remains constant.

The NI approach starts from an argument that change in financing mix of a firm will lead to change in WACC and will eventually result in the change in value of the firm.

According to NI approach, both the cost of debt and the cost of equity are independent of the capital structure; they remain constant regardless of how much debt the firm uses. As a result, the overall cost of capital declines and the firm value increases with debt. This approach has no basis in reality; the optimum capital structure would be 100 per cent debt financing under NI approach.



The effect of leverage on the cost of capital under NI approach

According to this approach, the cost of debt capital (kd) and the cost of equity (ke) remains unchanged and leverage changes. This means that as kd and ke remain same, the proportion of debt changes. As the proportion of debt increases, the ko (WACC) decreases and vice-versa. This happens because when the proportion of debt increases, kd which is lower than ke receives a higher weight in the calculation of WACC.

Calculate the value of Firm and WACC for the following capital structures			
EBIT of a firm Rs. 200,000.	Ke = 10%	Kd = 6%	
Debt capital Rs. 500,000	Debt = Rs. 700,000	Debt = Rs. 200,000	

Particulars	case 1		case 2		case 3
EBIT	2,00,000		2,00,000		2,00,000
(-) Interest	30,000		42,000		12,000
EBT	1,70,000		1,58,000		1,88,000
Ke	10%		10%		10%
Value of Equity	17,00,000		15,80,000		18,80,000
(EBT / Ke)					
Value of Debt	5,00,000		7,00,000		2,00,000
Total Value of Firm	22,00,000		22,80,000		20,80,000
WACC	9.09%		8.77%		9.62%
(EBIT / Value) * 100					

Conclusion: The firm is able to increase its value and decrease its WACC by increasing the debt proportion of in the capital structure.

Value of firm (V) = Value of Debt (D) + Value of Equity (E)

$$Costof Equity(k_e) = \frac{EquityEarnings(PAT)}{ValueofEquity(E)}$$

$$CostofDebt(k_d) = \frac{Interest(I)}{ValueofDebt(D)}$$

$$OverallCostofCapital\ (k_o) = \frac{NetOperatingIncome(EBIT)}{ValueofFirm(V)}$$

$$OverallCostofCapital\ (k_o) = W_dK_d + W_eK_e$$

The NI approach is easy to understand but ignores the most important aspects of leverage that the market price depends upon the risk, which varies in direct relation to the changing proportion of the debt in the capital structure.

NET OPERATING INCOME APPROACH

The NOI approach is the opposite of the NI approach. According to the NOI approach, the market value of the firm depends upon the net operating profit or EBIT and the overall cost of capital. The capital structure is irrelevant and does not affect the value of the firm. The NOI approach makes following assumptions:

- Investors see the firm as a whole and thus capitalize the total earning of the firm to find the value of the firm as a whole.
- The overall cost of capital of the firm is constant and depends upon the business risk, which is assumed to be unchanged.
- The cost of debt is remaining constant.
- The use of more debt in the capital structure increases the risk of the shareholders and thus results in increase in the cost of equity capital. The increase in the cost of equity offsets the benefits of employing cheaper debt.
- There is no tax.

NOI propositions:

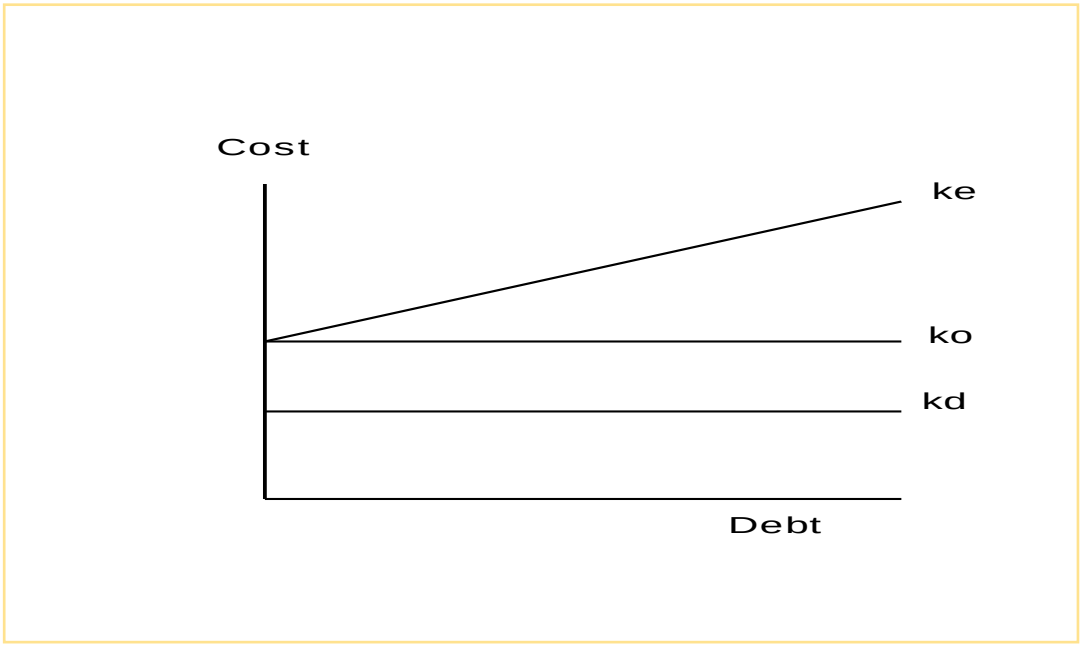
The use of higher debt component (borrowing) in the capital structure increases the risk of shareholders.

Increase in shareholders' risk causes the equity capitalization rate to increase, i.e. higher cost of equity (K_e)

A higher cost of equity (K_e) nullifies the advantages gained due to cheaper cost of debt (K_d)

In other words, the finance mix is irrelevant and does not affect the value of the firm.

According to NOI approach the value of the firm and the weighted average cost of capital are independent of the firm's capital structure. In the absence of taxes, an individual holding all the debt and equity securities will receive the same cash flows regardless of the capital structure and therefore, value of the company is the same.



According to this approach, as leverage increases, the expectations of equity share holders also increases and therefore the benefit of leverage setoff. It means the overall cost of capital (ko) remains constant and therefore value of firm does not change as leverage changes.

The NI and NOI approach hold extreme views on the relationship between the leverage, cost of capital and value of the firm. The major implication of NOI approach is that all capital structures are optimal. We cannot change the overall cost of capital merely by changing the mix of debt and equity. The value of the firm is always constant, dependent upon the business risk of the firm and independent level of debt.

$$k_o = k_d \left[\frac{D}{D+E} \right] + k_e \left[\frac{E}{D+E} \right]$$

Calculate the value of firm and cost of equity for the following capital structure -				
EBIT = Rs. 200,000.	WACC (Ko) = 10%	Kd = 6%		
Debt = Rs. 300,000, Rs. 400,000, Rs. 500,000		(under 3 options)		

Particulars	Option I		Option II		Option III
EBIT	2,00,000		2,00,000		2,00,000
WACC (Ko)	10%		10%		10%
Value of the firm	20,00,000		20,00,000		20,00,000
Value of Debt @ 6 %	3,00,000		4,00,000		5,00,000
Value of Equity (bal. fig)	17,00,000		16,00,000		15,00,000
Interest @ 6 %	18,000		24,000		30,000
EBT (EBIT - interest)	1,82,000		1,76,000		1,70,000
Hence, Cost of Equity (Ke)	10.71%		11.00%		11.33%

TRADITIONAL APPROACH

The traditional approach takes a compromising view between NI and NOI and incorporates the basic philosophy of both. It takes a midway between the NI approach and NOI approach. The traditional view point states that the value of the firm increases with increase in financial leverage but only up to a certain limit. Beyond this limit, the increase in financial leverage will increase it WACC and hence the value of the firm will decline.

Under traditional approach, the cost of debt is assumed to be less than the cost of equity. In case of 100%equity firm, overall cost of capital is equal to cost of equity but when debt is introduced in the capital structure and the financial leverage increases, the cost of equity remains the same as the equity investors expect a minimum leverage.

The cost of equity does not increase with increase in leverage. The argument for K_e remaining constant may be that up to a particular degree of leverage, the interest charge may not be large enough to pose a real threat to the dividend payable. The constant K_e and K_d makes the K_o to fall initially. But, this position does not continue when leverage is further increased.

The increase in leverage beyond certain limit increases the risk of the equity investors and as a result K_o also starts increasing. If the firm increases its leverage further, the risk of debt investors also increase and as a result K_d also starts increasing. Therefore, the use of leverage beyond a point will have the effect of increase the overall cost of capital and results in decrease in the value of the firm.

MODIGLIANI – MILLER'S APPROACH (CAPITAL STRUCTURE IRRELEVANCE THEORY)

The MM model was represented in 1958. It is considered to be one of the most influential papers ever written in corporate finance. MM approach is similar to NOI approach. According to this approach, the value of a firm is independent of its capital structure. The NOI approach is purely conceptual. It does not provide operational justification for irrelevance of the capital structure in the valuation of the firm. While MM approach supports NOI approach providing behavioural justification for the independence of total valuation and cost of capital from its capital structure. MM approach maintains that the WACC does not change in capital structure of the firm.

Basic Propositions

1. The overall cost of capital (K_o) and the value of the firm(V) are independent of the capital structure. In other words, K_o and V are constant for all levels of debt-equity mix. The total market value of the firm is given by capitalizing the expected NOI by the rate appropriate for the risk class.
2. The cost of equity (k_e) is equal to capitalization rate of a pure equity stream plus a premium for the financial risk. The financial risk increases with more debt content in the capital structure.
3. The cut-off rate for investment purposes is completely independent of the way in which an investment is financed.

Assumptions

1. Capital markets are perfect. The information is freely available.
2. There is no transaction cost and bankruptcy cost.
3. Investors are rational. They are well informed and choose combination of risk and return which is most advantageous to them. Investors have homogenous expectations about future earnings.
4. Firms can be grouped into equivalent classes on the basis of their business risk.
5. There is no tax.

Limitations of MM approach

1. Bankruptcy cost is involved and it is more in levered firm.
2. There is a difference between personal leverage and corporate leverage.

3. Agency cost is involved.

ARBITRAGE PROCESS

The arbitrage process is the operational justification of MM hypothesis. The term arbitrage refers to an act of buying a security in one market having lower price and selling it in another market at higher price. As a result of such action, the market prices of securities cannot remain different. Arbitrage process restores equilibrium in the value of securities. This is because investors of the overvalued firm would sell their shares, borrow additional funds on personal account and invest in the undervalued firm to obtain the same return on smaller investment outlay or more return on same investment outlay. The use of debt by the investor for arbitrage is termed 'personal leverage'.

Two firms X Ltd. and Y Ltd. are alike and identical in all respects except that X Ltd. is a levered firm and has 10% debt of Rs. 30,00,000 in its capital structure. On the other hand Y Ltd. is an unlevered firm and has raised funds only by the way of equity funds. Both this firms have the same EBIT of Rs. 10,00,000 and equity capitalization rate (K_e) of 20%. Under these parameters, the total value of the firm may be ascertained as follows:

	X Ltd.	Y Ltd.
EBIT Less – Interest	10,00,000 -3,00,000	10,00,000 ----------
Net Profit	7,00,000	10,00,000
Equity Capitalization Rate (Ke)	20%	20%
Value of Equity + Value of Debt	35,00,000 30,00,000	50,00,000 NIL
Value of Firm	65,00,000	50,00,000
WACC	15.38%	20%

Mr. A is holding 10% equity shares in X Ltd. The value of his investment is Rs. 3,50,000 (i.e. 10% of Rs. 35,00,000). Further he is entitled for Rs. 70,000 income (10% of 7,00,000). In order to earn more income, he disposes off his holding in X Ltd. for Rs. 3,50,000 and buys 10% holding in Y Ltd. We will discuss the arbitrage steps as follows:

Step 1:

In order to buy 10% holding in Y Ltd., he requires total funds of Rs. 5,00,000 i.e. (10% of 50,00,000), where as he has received only Rs. 3,50,000. Therefore, he borrows Rs. 3,00,000 loan @ 10% (i.e. 10% of 30,00,000 debt of X Ltd.) Thus, he substitutes personal loan for corporate loan.

Step 2:

Total funds with Mr. A (3,50,000 + 3,00,000)	6,50,000
Less – Invested in shares of Y Ltd.	5,00,000
Surplus Funds (invested in some other source at 10%)	1,50,000

Step 3: Mr. A will earn in the following manner

Profits available to Mr. A from Y Ltd. @ 10 % (10% of 10,00,000)	1,00,000
Less – Interest on borrowed loan 10% (10% of 3,00,000)	(30,000)
Net Profit	70,000
Additional income from surplus funds invested @ 10% (10% of 1,50,000)	15,000
Total Profit	**85,000**

Earnings of Mr. A from Y Ltd. = Rs. 85,000

Earnings of Mr. A from X Ltd. = Rs. 70,000

Arbitrage Profit = Rs. 15,000

Examples

1. From the following information determine the value of P and Q firms having equal risk. Find the value according to N.I. Approach and N.O.I. Approach.

Particulars	Firm P (Levered)	Firm Q (Unlevered)
EBIT Interest @ 10%	2, 00,000 50,000	2, 00,000

   Rate of equity capitalization is 15% and rate of corporate tax is 50%.

2. Following details relate to two firms Alpha & Beta. Both companies belong to the homogenous risk group. Company Alpha is a levered company while Beta is an unlevered company. The capital structure of the levered ompany includes 12% debentures of Rs. 5, 00,000. The total assets of both the companies are worth Rs. 12, 00,000. And both earn 16% return before taxes and interest on their assets. Tax rate 50% and rate of equity capitalization is 15%. Compute the value of both companies on the basis of N.I. Approach and N.O.I. Approach.

3. Company X and Y are identical in all respects except that X is an unlevered compay while Y is a levered company. Y company's capital structure includes 10% debentures of Rs. 5, 00,000. The values of these two companies according to NOI approach is as follows:

Particulars	X Company	Y Company
EBIT	1, 50,000	150000
Interest on Debentures	NIL	50000
Net Income available on Equity	1, 50,000	100000
Rate of Equity capitalization	0.125	.14
Market Value of Equity Shares	12, 00,000	714286
Market Value of Debentures	NIL	500000
Overall value of the company	12, 00,000	1214286
Overall cost of capital	12.5%	12.35%

An investor holds 10% equity shares of Y company. How can he reduce his investment by engaging in personal leverage? When will the arbitrage process come to an end according to MM approach?

4. According to traditional approach, the market value of company X and Y are as under:

Particulars	X	Y
EBIT	50000	50000
Cost of Debts	0	10000
Net Income to Equity	50000	40000
Cost of Equity Capital	0.10	0.11
Market Value of Equity	500000	360000
Market Value of Debts	0	200000
Total Value of the company	500000	560000
Avg. Cost of Capital	0.10	0.09

According to MM approach, calculate the cost of capital and the value of the company X and Y. Assume that there are no taxes and the rate of equilibrium is 12.5%.

5. The following data regarding two companies X and Y belonging to the same equivalent risk is as follows:

	Company X	Company Y
No. Of Equity Shares	90,000	1,50,000
Market Price per share	Rs. 1.20	Rs. 1

6% Debentures	60,000	----------
Profit Before Interest	18,000	18,000

Explain how under MM approach, an investor holding 10% of shares in Company X will be better off in switching his holding to Company Y.

6. Company X and Company Y are in same risk class and identical in every aspect except that company X uses debt while company Y does not. The firm X has 9,00,000 debentures, carrying 10% rate of interest. Both the firms warn 20% before interest and taxes on their total assets of 15,00,000.

   Assume a tax rate of 50% and equity capitalisation rate of 15%.
   a) Compute the values of Co. X and Y using NI approach.
   b) Compute the value of each firm using NOI approach.
   c) Using NOI approach, calculate overall cost of capital for firm X and Y.
7. ABC Ltd. is expecting an EBIT of 2,00,000. The company has Rs. 8,00,000 debentures. The cost of equity is 12.5%. You are required to calculate the value of the firm using NI approach. Also calculate WACC.

8. PQR Ltd. is expecting an EBIT of Rs. 4,00,000 and belongs to the risk class (WACC) of 10%. You are required to find out the value of firm and cost of equity if it employs 8% debt to the extent of 20%, 35% or 50% of the total financial requirement of Rs. 20,00,000.

9. XYZ Ltd. is expecting an EBIT of Rs. 3,00,000. The company presently raised its entire fund requirement of Rs. 20,00,000 by the issue of equity with the capitalisation rate of 16%. The firm is now contemplating to redeem a part of equity capital by introducing debt. The firm has two options to raise debt to the extent of 30% or 50% of total funds. It is expected that for debt financing up to 30%, the rate of interest will be 10% and equity capitalisation rate will increase to 17%. It the firm opts for 50% debt then the interest rate will be 12% and equity capitalisation rate will be 20%. You are required to calculate the value of the firm and overall cost of capital.

10. Company X and Y are identical in all respects except that X is an unlevered company while Y is a levered company. Y Company's capital structure includes 10% debentures of Rs. 10,00,000. The values of these two companies according to NOI approach is as follows:

Particulars	X Company	Y Company
EBIT	5,00,000	5,00,000
Interest on Debentures @ 10%	NIL	1,00,000
Net Income available on Equity	5,00,000	4,00,000
Rate of Equity capitalization	20%	20%
Market Value of Equity Shares	25, 00,000	20,00,000
Market Value of Debentures	NIL	10,00,000
Overall value of the company	25,00,000	30,00,000

An investor holds 10% equity shares of Y company. How can he reduce his investment by engaging in personal leverage? When will the arbitrage process come to an end according to MM approach?