

CAPITAL STRUCTURE

Capital structure is the mix of long-term sources and it includes equity capital, preference shares and long-term debt capital. Capital structure must be decided in a way that it protects the owners interest by assuming an optimal return continuously.

CAPITAL STRUCTURE THEORIES

Capital structure Theories describe the relationship between capital structure, cost of capital and the value of the firm.

Assumptions of Capital Structure Theories

1. There are only two sources of finance i.e. debt and equity.
2. There are no taxes.
3. Entire earnings are distributed as dividends; the dividend payout ratio is 100%.
4. There are no retained earnings.
5. The company has infinite life.
6. The operating profit (EBIT) is given and is not expected to grow.
7. Total assets of the company are given and are not expected to change.
8. Business risk is constant over time and is independent of capital structure and financial risk.

Understand the following things first,

$$\text{Market Value of Equity (S)} = \frac{NI}{K_e} \quad (\text{Where, NI} = \text{EBIT} - \text{Interest})$$

$$\text{Market Value of Debt (B)} = \frac{\text{Interest}}{K_d}$$

$$\text{Total Market Value of the firm (V)} = S+B$$

$$\text{Proportion of Equity in capital structure} = \frac{S}{S+B}$$

$$\text{Proportion of Debt in capital structure} = \frac{B}{S+B}$$

$$\text{Total M.V. of Firm (V)} = \frac{EBIT}{k_0}$$

$$\text{Overall Cost of Capital or Equity Capitalization rate (K}_0\text{)} = K_e \left(\frac{S}{V} \right) + K_d \left(\frac{B}{V} \right)$$

NET INCOME APPROACH

David Durant gave the theory of Net Income. According to this approach the value of a company is affected by its capital structure and cost of capital.

According to this approach, the increase in the proportion of debt capital in the capital structure brings a decrease in overall cost of capital because debt is a cheaper Source of finance. The decrease in cost of capital in turn increases the value of the firm.

Thus, when proportion of debt is 100% in capital structure, cost of capital is minimum. And when there is no debt in capital structure, the cost of capital is maximum.

Assumptions:

1. There are no taxes.
2. There are only two sources of finance i.e. debt and equity.
3. Cost of debt is less than cost of equity.
4. The increase in proportion of debt capital in the capital structure do not affect the risk perception of equity shareholders.

(Solve example 1 and 2)

NET OPERATING INCOME APPROACH

This approach is also given by David Durand. This approach is just opposite of Net Income Approach. According to this approach there is no relationship between capital structure, cost of capital and values of the firm. The theory holds that change in proportion of debt in the capital structure does not change the overall cost of capital and value of the firm.

Reason: when we increase the proportion of debt in the capital structure of the company, overall cost of capital decreases. But at the same time, the interest burden on the company increases. When interest payments increases, risk perception of the equity shareholders also increases and they start expecting higher returns from the company. This increases cost of equity capital. Due to this phenomenon, the decrease in cost of capital due to increase in proportion of debt is offset and overall cost of capital remains same.

Assumptions:

1. The change in proportion of debt capital in the capital structure increase the risk perception of equity shareholders.
2. The overall cost of capital remains same for all degrees of debt-equity mix.
3. The value of the equity is residual value which is determined by deducting total value of debt from the total value of company.

4. There are no corporate taxes.
5. Cost of debt does not change.

Let me make you clear about the following things

1. To verify the overall cost of capital we would use following formula
Overall Cost of Capital or Equity Capitalization rate (K_0) = $K_e \left(\frac{S}{V} \right) + K_d \left(\frac{B}{V} \right)$
2. Market value of debt will remain constant and market value of equity is residual value. So market value of equity will be calculated by
Market Value of Equity (S) = Total M.V. of Firm (V) – M.V. of Debt (B)
3. Market value of Firm is calculated by
$$\text{Total M.V. of Firm (V)} = \frac{EBIT}{k_0}$$
4. Cost of Equity $K_e = \frac{NI}{M.V. \text{ of Equity}}$

Let's take an example to understand this

X It. has submitted the following details

Earnings before interest and taxes	2,00,000
Debt borrowed at the rate 10%	10,00,000
Overall Capitalization rate	12.5%

Find out the value of firm under NOI Approach when (i) debt is increased by 4,00,000
(ii) debt is decreased by 4,00,000.

Solution:

EBIT	2,00,000
Less: Interest	1,00,000
Net Income	1,00,000

$$\text{Total M.V. of Firm (V)} = \frac{EBIT}{k_0} = \frac{2,00,000}{12.5} \times 100 = 16,00,000$$

Market Value of Equity = Total M.V. of Firm (V) – M.V. of Debt (B)

$$= 16,00,000 - 10,00,000$$

$$= 6,00,000$$

$$\text{Cost of Equity } K_e = \frac{NI}{M.V. \text{ of Equity}} = \frac{1,00,000}{6,00,000} * 100 = 16.67\%$$

Now we could verify it

$$\text{Overall Cost of Capital or Equity Capitalization rate } (K_0) = K_e \left(\frac{S}{V} \right) + K_d \left(\frac{B}{V} \right)$$

$$= K_e \left(\frac{S}{V} \right) + K_d \left(\frac{B}{V} \right)$$

$$= 16.67 \left(\frac{6,00,000}{16,00,000} \right) + 10 \left(\frac{10,00,000}{16,00,000} \right)$$

$$= 16.67 (0.375) + 10 (0.265)$$

$$= 12.50\%$$

1. When Debt is Increased by 4,00,000

EBIT	2,00,000
Less: Interest	1,40,000
Net Income	60,000

$$\text{Total M.V. of Firm (V)} = \frac{EBIT}{k_0} = \frac{2,00,000}{12.5} \times 100 = 16,00,000$$

$$\text{Market Value of Equity} = \text{Total M.V. of Firm (V)} - \text{M.V. of Debt (B)}$$

$$= 16,00,000 - 14,00,000$$

$$= 2,00,000$$

$$\text{Cost of Equity or Equity Capitalization Rate} = \frac{NI}{M.V. \text{ of Equity}} = \frac{60,000}{2,00,000} * 100 = 30\%$$

Now we could verify it

$$\text{Overall Cost of Capital or Equity Capitalization rate } (K_0) = K_e \left(\frac{S}{V} \right) + K_d \left(\frac{B}{V} \right)$$

$$= K_e \left(\frac{S}{V} \right) + K_d \left(\frac{B}{V} \right)$$

$$= 30 \left(\frac{2,00,000}{16,00,000} \right) + 10 \left(\frac{14,00,000}{16,00,000} \right)$$

$$= 30 (0.125) + 10 (0.875)$$

$$= 12.50\%$$

2. When Debt is decreased by 4,00,000

EBIT	2,00,000
Less: Interest	60,000
Net Income	1,40,000

$$\text{Total M.V. of Firm (V)} = \frac{EBIT}{k_0} = \frac{2,00,000}{12.5} \times 100 = 16,00,000$$

$$\text{Market Value of Equity} = \text{Total M.V. of Firm (V)} - \text{M.V. of Debt (B)}$$

$$= 16,00,000 - 6,00,000$$

$$= 10,00,000$$

$$\text{Cost of Equity or Equity Capitalization Rate} = \frac{NI}{M.V. of Equity} = \frac{1,40,000}{10,00,000} \times 100 = 14\%$$

Now we could verify it

$$\text{Overall Cost of Capital or Equity Capitalization rate (K}_0\text{)} = K_e \left(\frac{S}{V} \right) + K_d \left(\frac{B}{V} \right)$$

$$= K_e \left(\frac{S}{V} \right) + K_d \left(\frac{B}{V} \right)$$

$$= 14 \left(\frac{10,00,000}{16,00,000} \right) + 10 \left(\frac{6,00,000}{16,00,000} \right)$$

$$= 14 (0.625) + 10 (0.375)$$

$$= 12.50\%$$

In Net Operating Income, If taxes are given, then

$$\text{Value of Unlevered Company} = \frac{EBIT(1-t)}{k_e}$$

$$\text{Value of levered company} = \text{Value of unlevered company} + \text{Debt (t)}$$

In case of unlevered firm K_0

$$= K_e \text{ (because there is no debt)}$$

$$= \text{M.V. of Equity (S)} = \text{M.V. of Firm (V)}$$

Exercise: Question number 2

Given following information

	Levered firm	Unlevered firm
EBIT	2,50,000	2,50,000
Debt	2,00,000	0
Rate	10%	0
Equity Capitalization Rate	16%	16%
Corporate Tax rate	35%	35%

Find out the value of the firms using NOI Approach

First we will calculate the value of unlevered firm

EBIT	2,50,000
Less: Interest	0
EBT	2,50,000
Less: Tax	87,5000
Net Income for Equity	1,62,500

$$\text{Value of Equity} = \frac{NI}{k_e} = \frac{1,62,500}{16} * 100 = 10,15,625 \quad \text{or it can be calculated directly}$$

$$\text{Value of unlevered firm} = \frac{EBIT (1-t)}{k_e} = \frac{2,50,000 (1-.35)}{0.16} = 10,15,625$$

$$\begin{aligned} \text{Value of levered company} &= \text{Value of unlevered company} + \text{Debt (t)} \\ &= 10,15,625 + 2,00,000 (.35) \\ &= 10,15,625 + 70,000 \\ &= 10,85,625 \end{aligned}$$

(Solve examples)

MODIGLIANI-MILLER THEORY OF CAPITAL STRUCTURE

This approach states that change in capital structure does not affect the value of the firm. MM approach maintains that the Overall Cost of Capital (K_0) remains constant and does not change due to change in debt-equity mix. It supports NOI approach that market value of a firm is independent of its capital structure. While NOI failed to provide a behavioral justification for its argument; the MM approach provides behavioral justification through the process of arbitrage.

Arbitrage is simultaneously buying and selling securities in two different market in order to earn profit due to differences in prices in those markets. In the same way, MM used two different firms with different market values, where investors switch from one firm to another firm to earn profits due to difference in market value of firms.

Assumptions

1. Capital markets are perfect: Investors are rational. it means that information is available to all investors easily and freely. Investors are free to buy and sell securities. There is no transaction cost. investors can lend and borrow at the same time.
2. Dividend Payout Ratio is 100%. It means that retained earnings is 0.
3. Business risk are equal among all companies with similar operating environment. This means that all companies can be divided into 'equivalent risk class' or 'homogeneous risk class'.
4. Given the assumption of perfect information and rationality. All investors have same expectations of EBIT from the company.
5. There are no corporate taxes. (this assumption was removed later)

Propositions of MM Hypothesis

1. The Overall Cost of Capital(K_0) and the Value of company are independent of capital structure. This means that K_0 and V will remain constant at any degree of debt-equity mix.
2. With increase in debt proportion in the capital structure the financial risk increases due to increase in interest burden. Hence, the equity shareholders also expect higher return. Hence, cost of equity also increases.

Let's take an example to understand the MM Approach

Exercise: Question No. 6

Given the information of the two companies

EBIT	2,25,000	2,25,000
DEBT	12,00,000	0
RATE	12%	0
Ke	20%	16%

The companies are identical in all respects except that X ltd. is levered firm whereas Y Ltd. is unlevered. Calculate the values of two firms and Using MM approach, show, how an investor Mr. X holding 10% equity shares in X Ltd. would be better off by switching over his investment from X Ltd. to Y Ltd.

Solution:

EBIT	2,25,000	2,25,000
Less: Interest (12*12,00,000)	1,44,000	0
Net Income	81,000	2,25,000
Market Value of Equity	$\frac{NI}{Ke} \times 100$	$\frac{NI}{Ke} \times 100$
	$\frac{81,000}{20} \times 100$	$\frac{2,25,000}{16} \times 100$
	4,05,000	14,06,250
Market Value of Debt	12,00,000	--
Total Market Value of Company	16,05,000	14,06,250

Let us make it clear that

- Mr. X share in X Ltd is 1,60,500 (10% of 16,05,000)
- Mr. X is earning dividend of 8,100 i.e. 10% of 81,000 as 81,000 is earnings available for equity.

as per MM Approach, Mr. X will switch over his investment.

- In order to acquire 10% shares in Y Ltd which has a total Market Value is 14,06,250. Mr. X would need Rs. 1,40,625 (10% of 14,06,250).
- While he would only have 40,500 by selling his investment in X Ltd (10% of 4,05,000)
- Thus, he will need extra 1,00,125 (1,40,625-40,500).
- Out of total interest burden in X Ltd. was 1,44,000. his share in interest burden was 14,400 (10% of 1,44,000).
- In order to have the same level of risk, Mr. X would raise 1,20,000 @12 so that his interest burden remains the same to 14,400.
- His total funds would now be 1,20,000+40,500= 1,60,500
- But he only has to invest only 1,40,625 for purchasing 10% shares in Y Ltd. Thus he would have a surplus of 19,875 (1,60,500 - 1,40,625)
- After acquiring 10% in Y Ltd his income will be
Dividend 10% of 2,25,000 22,500
Less: Interest 14,400
 8,100

Which is the Same amount he was earning X Ltd.

But he will also earn extra income by investing the surplus of 19,875. Which would be

$$\frac{22,500}{1,40,625} \times 19,875 = 3180.$$

Another way of interpreting is

As Mr. X was getting 22,500 on the investment of 1,40,625. For one rupee investment he would be getting $\frac{22,500}{1,40,625} = ₹ 0.16$.

By investing another 19,875 he will earn $19,875 \times 0.16 = 3180$.

On the basis of this solve example 4 given in the book.

Exercise: Question 7

Using the Data of the following companies:

Given	Levered Company	Unlevered Company
EBIT	5,00,000	5,00,000
Debt	2,00,000	0
Rate	12%	0
Ke	20%	16%

- (a) Find the values of the Company
- (b) Explain how arbitrage would equate the values of the company
- (c) What will be additional earnings for investor holding 10% equity in unlevered firm.
Who would switch over to levered firm.

Solution:

- (a) Value of the companies

EBIT	5,00,000	5,00,000
Less: Interest (12*2,00,000)	24,000	0
Net Income	4,76,000	5,00,000
Market Value of Equity	$\frac{NI}{Ke} \times 100$	$\frac{NI}{Ke} \times 100$
	$\frac{4,76,000}{20} \times 100$	$\frac{5,00,000}{16} \times 100$
	23,88,000	31,25,000
Market Value of Debt	2,00,000	--
Total Value of the firm	23,80,000	31,25,000

- (B) Arbitrage Process:

For ease of explanation let me name the investor as Mr. X, levered firm as X and Unlevered firm as Y.

Let us make it clear that

- a) Mr. X share in Unlevered Firm Y is 3,12,500 (10% of 31,25,000)
- b) Mr. is earning a dividend of 50,000 i.e. 10% of 5,00,000. as earning for equity is 5,00,000.

1. Mr. X would sell his share in Unlevered Firm Y which is 3,12,500 (10% of 31,25,000) to acquire 10% shares in levered firm X.
2. To acquire 10% share in levered firm X he would require 2,38,000 (10% of 23,80,000).
3. He would have 3,12,500 by selling his investment in unlevered firm Y. So, out of this 3,12,500, he would pay 2,38,000 to acquire 10% share in levered firm X
4. Thus, even after purchasing, he would have a surplus of 74,500 (3,12,500 - 2,38,000).
5. In order to have the same financial risk, He will lend this surplus @12%. Thus, he will get a return of 8,940 (12% of 74,500) on the surplus.
6. For his 10% investment, He would also get 47,600 (10% of 4,76,000) dividends from levered company X.
7. So, his **total earnings** would be $8,940 + 47,600 = 56,540$
8. His **additional earnings** by switching would be $56,540 - 50,000 = 6,540$.

As calculated above additional earnings of Mr. X would be 6,540.

Limitations of Modigliani and Miller approach

1. **The arbitrage process is not realistic:** the arbitrage process suggested by MM is not realistic because there is significant difference in corporate leverage and personal leverage. And risk exposure is also different.
2. **Presence of transaction cost:** the no transaction cost assumption is also not valid. In real life, when a person buys/sells securities, he has to pay transaction cost.
3. **Imposition of institutional restrictions:** switching from levered to unlevered firm may not be allowed to all types of investors. There may be restrictions on institutional investors to engage in this kind of purchase and sell.
4. **Corporate taxes do not exist:** In real practice, corporate taxes do exist. If corporate taxes are taken to be exist, MM theory would fail to prove its argument.

TRADITIONAL APPROACH

It is also known as intermediate approach. It is a midway between Net Income Approach and Net Operating Income Approach.

This approach resembles the Net Income Approach in arguing that capital structure and cost of capital affects the value of the firm but it discards the view that value of company will necessarily increase for all the degrees of debt-equity mix.

Similarly, this approach maintains with the NOI that beyond a certain point of change in proportion of debt, the overall cost of capital increases leading to decrease in the value of company. But it differs from NOI that Weighted average cost of capital remains same for all degrees of debt—equity mix.

Essential of Optimum Capital Structure

1. Simplicity
2. Flexibility
3. Maximum return
4. Minimum cost
5. Minimum risk
6. Maximum control
7. Adequate liquidity
8. Incidental to legal requirement

Determinants of Capital Structure

1. Certainty, adequacy and regularity of income.
2. Affected by choice of promoters and directors
3. Debt capacity and risk taking ability of firm
4. Weighted average cost of capital
5. Nature of business
6. Financial policies
7. Capital market conditions
8. Psychological state of investors and risk taking capability
9. Expenses of issuing debt and equity
10. Government control, rules and regulations.

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