CHAPTER - 3 — Financing Decisions Capital Structure
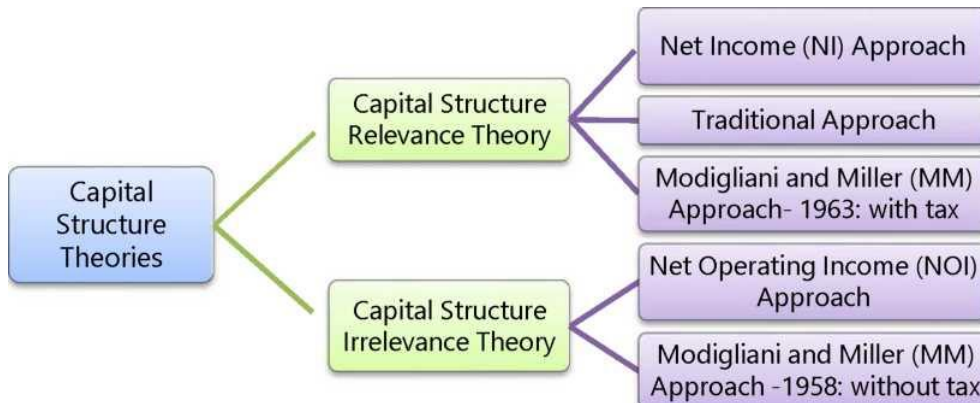
1. CAPITAL STRUCTURE THEORIES

The following approaches explain the relationship between cost of capital, capital structure and value of the firm:

a)   Net Income (NI) approach

b)   Traditional approach.

c)   Net Operating Income (NOI) approach

d)   Modigliani-Miller (MM) approach

GENERAL ASSUMPTIONS IN CAPITAL STRUCTURE THEORIES :

▪   There are only two kinds of funds used by a firm i.e. debt and equity. **[No Preference Share Capital]**

▪   The total assets of the firm are given. The degree of leverage can be changed by selling debt to purchase shares or selling shares to retire debt. **[No change in Capital Employed].**

▪   Taxes are not considered. **[No corporate or personal taxes]**

▪   The dividend payout ratio is 100%. **[No retained earnings]**

▪   The firm's total financing remains constant.

▪   Business risk is constant over time. **[No change in fixed costs or operating risks]**

▪   The firm has perpetual life.

▪   The capital structure can be altered without incurring transaction.

▪   The firm earns operating profits and it is not expected to grow. **[No losses]**

1.1 NET INCOME (NI) APPROACH

According to this approach, capital structure decision is **relevant** to the value of the firm.

Specific Assumptions: The following additional assumptions are made:

1.   The Cost of Debt (Kd) is always less than Cost of Equity (Ke). (Kd < Ke)

2.   Kd and Ke remain constant at all levels of debt-equity mix.

3.   The use of debt content does not change the risk perception of investors.

4.   Ko decreases with the increase in debt in capital structure.

Theory or Explanation :

1.   Debt is a cheaper source of finance than equity due to investor's risk expectations.

2.   Use of cheaper debt funds in total capital structure will reduce the Overall or Weighted Cost of Capital since Debt percentage increases in the total capital structure.

3.   Hence, as the degree of financial leverage increases, the WACC will decline with every increase in the

debt content in total funds employed.

4. Since Value of Firm = EBIT / WACC, the value of firm will increase for every decline in WACC.

5. Where debt content is reduced, the reverse will happen, i.e. WACC will increase thereby reducing the value of the firm.

6. **Optimum capital Structure**

    ▪ **Thus, a firm can increase its value and lower the overall cost of capital by increasing the proportion of debt in the capital structure.**

    ▪ **The Value of the Firm will be maximum at a point where WACC is minimum.**

    ▪ **Thus, the theory suggests total or maximum possible debt financing for minimising the cost of capital.**

Application: The application of theory in determining WACC involves the following steps:

Step	Procedure
1	Determine EBIT.
2	Compute EBT (Net Income) = EBIT less Interest on Debt Funds
3	Compute Market Value of Equity (S) = EBT (Net Income) / Cost of Equity (Ke)
4	Compute Market Value of Debt (D) = Interest / Cost of Debt (Kd)
5	Compute Market Value of Firm (V) = S + D = Market Value of Equity + Market Value of Debt
6	Compute Overall Cost of Capital (Ko) = EBIT / Value of Firm (V)
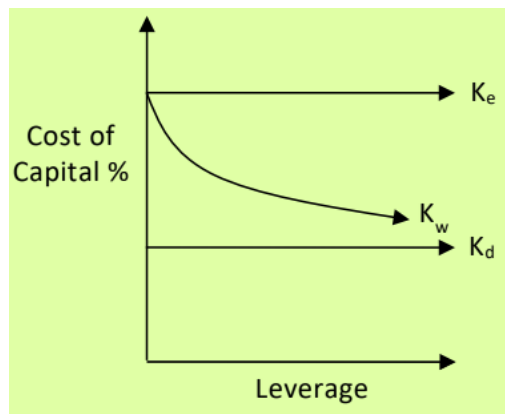
PROBLEM : 1

Rupa Ltd. 's EBIT is ₹5,00,000. The company has 10%, ₹20 lakh debentures. The equity capitalization rate (K_e) is 16%.

You are required to CALCULATE:

(i)   Market value of equity and value of firm

(ii)   Overall cost of capital   (Study Material)

SOLUTION : 1

i)   Statement showing Market value of equity and value of firm

	₹
EBIT	5,00,000
Less: Interest on debentures (10% of ₹ 20,00,000)	(2,00,000)
Earnings available for equity holders i.e. Net Income (NI)	3,00,000
Equity capitalization rate (Ke)	16%
Market value of equity (s)= $\dfrac{NI}{Ke}$ = $\left(\dfrac{3,00,000}{16} \times 100\right)$	18,75,000

Market value of debt (D)	20,00,000
Total value of firm V = S + D	38,75,000

ii) Overall cost of capital $= \dfrac{\text{EBIT}}{\text{Value of firm}} = \dfrac{₹\,5,00,000}{₹\,38,75,000} = 12.90\%$

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1.2 NET OPERATING INCOME (NOI) APPROACH

Under NOI approach, the total value of the firm will not be affected by the composition of capital structure. Capital structure decisions of the firm are **irrelevant.**

Assumptions: The following additional assumptions are made:

1. The Cost of Debt (Kd) is always less than Cost of Equity (K$_e$). **(K$_d$ < K$_e$)**

2. Kd (Debt Capitalisation Rate) remains constant at various levels of debt-equity mix.

3. Ke (Equity Capitalisation Rate) increases as debt content increases due to higher financial risk and higher expectations of equity investors.

4. The market (investors in debt as well as equity) capitalises the value of the firm as a whole, without giving importance to the debt-equity mix. **Hence Overall Cost of Capital is constant.**

Theory or Explanation:

1. Debt may be cheaper than equity. But the risk perception of equity investors increases with the use of additional debt in the capital employed.

2. Increase in financial risk causes the equity capitalisation rate to increase.

3. Thus, the advantage of using low-cost debt is set off exactly by increase in equity capitalisation rate.

4. Therefore, the overall cost of capital remains constant for all degrees of debt-equity mix.

5. The market capitalizes the value of firm as a whole. Thus the split between debt and equity is not important.

6. The market value of the firm is ascertained by capitalising the net operating income at the overall cost of capital, which is constant. **The market value is not affected by, debt -equity mix change.**

7. **Optimum capital Structure**

Since WACC is constant at all levels, every debt-equity mix is as good as any other mix. There is no optimum capital structure. Every capital structure is optimal one.

Application:

The application of theory in determining Cost of Equity involves the following steps:

Step	Procedure
1	Determine EBIT (Net Operating Income)
2	Compute EBT = EBIT less Interest on Debt Funds
3	Compute Market Value of Firm (V) = EBIT (Net Operating Income) / WACC (Ko)
4	Compute Market Value of Debt (D) = Interest / Cost of Debt (Kd)
5	Compute Market Value of Equity (S) = V - D = Market Value of Firm - Market Value of Debt
6	Compute Cost of Equity Capital (Ke) = EBT / Value of Equity (S)
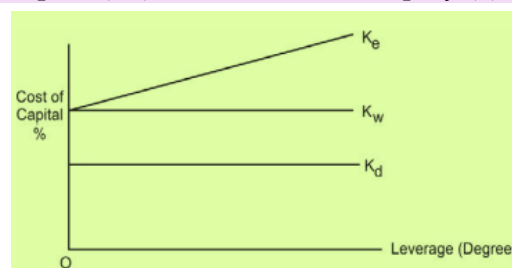
The above diagram shows that Kw (Weighted Average Cost of Capital) and Kd (debt capitalisation rate) are

constant and Ke (Cost of equity) increases with leverage.

PROBLEM : 2

Amita Ltd.'s operating income (EBIT) is ₹ 5,00,000. The firm's cost of debt is 10% and currently the firm employs ₹ 15,00,000 of debt. The overall cost of capital of the firm is 15%.

You are required to CALCULATE:

(i)   Total value of the firm

(ii)   Cost of equity   (Study Material)

SOLUTION : 2

i)	Statement showing total value of the firm	₹
	Net operating income (EBIT)	5,00,000
	Less: Interest on debentures (10% of ₹ 15,00,000)	(1,50,000)
	Earnings available for equity holders	3,50,000
	Total cost of capital (K0) (given)	15%
	Value of the firm (v)= $\dfrac{\text{EBIT}}{K_0}$ = $\dfrac{₹\,5,00,000}{0.15}$	33,33,333
(ii)	**Calculation of cost of equity**	₹
	Market value of debt (D)	15,00,000
	Market value of equity (S) = V - D = ₹' 33,33,333 - ₹ 15,00,000	18,33,333

$$K_e = \frac{\text{Earnings available for equity holders}}{\text{Value of equity (S)}}$$

$$\text{Or,} = \frac{\text{EBIT} - \text{Interest paid on debt}}{\text{Market value of equity}} = \frac{₹\,3,50,000}{₹\,18,33,333} = 19.09\%$$

OR

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

$$K_e = K_o \left(\frac{V}{S}\right) - K_d \left(\frac{D}{S}\right)$$

$$= 0.15 \left(\frac{33,33,333}{18,33,333}\right) - 0.10 \left(\frac{15,00,000}{18,33,333}\right)$$

$$K_e = \frac{\text{Earnings available for equity holders}}{\text{Value of equity (S)}}$$

$$\text{Or,} = \frac{\text{EBIT} - \text{Interest paid on debt}}{\text{Market value of equity}} = \frac{₹\,3,50,000}{₹\,18,33,333} = 19.09\%$$

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1.2.1 TRADITIONAL APPROACH

It takes a mid-way between the NI approach and the NOI approach.

Assumptions: Apart from the general assumptions, the following additional assumptions are made:

1.   The Cost of Debt (Kd) is always less than Cost of Equity (Ke).

2.   Kd and Ke vary with change in debt-equity mix. As debt content increases, financial risk increases, causing increase in the expectations of equity investors and rise in the cost of equity. Also additional loans can be taken only at a higher rate of interest. So Cost of Debt also rises beyond a certain level of debt content.

3.   Increase in Cost of Equity is more steeper and higher than increase in cost of debt.

Theory or Explanation:

1. Debt is a cheaper source of finance than equity due to tax saving effect and investor's risk expectations.

2. Use of cheaper debt funds in total capital structure will reduce the Overall or Weighted Cost of Capital since Debt percentage increases in the total capital structure. This is because the benefits of cheaper debt may be so large that even in offsetting the effect of increase in cost of equity, the WACC may go down.

3. Hence, as the degree of financial leverage increases, the WACC will decline with every increase in the debt content in total funds employed.

4. However, if financial leverage increases beyond an acceptable limit (called the optimal point), the cost of debt and cost)f equity start rising. This is because of the high financial risk associated with the firm.

5. The increasing cost of equity owing to increased financial risk and increasing cost of debt makes the overall cost of capital to increase.

6. The firm should strive to reach the optimal capital structure and maximise its total value through a judicious use of both debt and equity in the capital structure. At the optimal capital structure the overall cost of capital will be minimum and the value of the firm is maximum.

7. Thus, as per the Traditional Theory, the firm should try to achieve the optimal Capital Structure by minimising WACC and maximising its value.

Application: The application is the same as that of Net Income Approach, except that Ke and Kd differ for different degrees of debt-equity mix. The least WACC should be selected for the optimal Capital Structure.
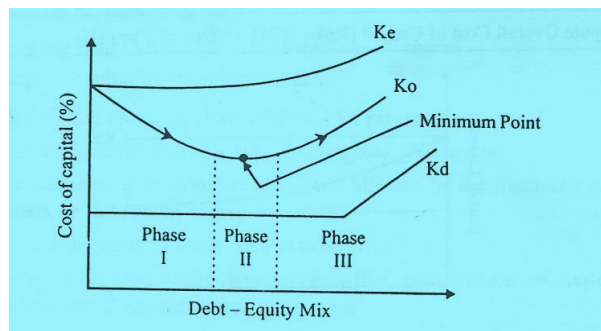
Optimum capital structure occurs at the point where value of the firm is highest and the cost of capital is the lowest.

MAIN HIGHLIGHT OF TRADITIONAL APPROACH

The firm should strive to reach the optimal capital structure and its total valuation through a judicious use of both the debt and equity in capital structure.

At the optimal capital structure, the overall cost of capital will be minimum and the value of the firm will be maximum.

PROBLEM : 3

Indra Ltd. has an EBIT of ₹ 1,00,000. The company makes use of both the debt and equity capital. The firm has 10% debentures of ₹ 5,00,000 and the firm's equity capitalization rate is 15%.

You are required to COMPUTE:

i. Total value of the firm

ii. Overall cost of capital.   **(Study Material)**

SOLUTION : 3

i) Calculation of total value of the firm

	₹
EBIT	1,00,000
Less: Interest (@10% on ₹ 5,00,000)	50,000
Earnings available for equity holders	50,000
Equity capitalization rate i.e. K_e	15%

Value of equity (S) = $\dfrac{\text{Earnings available for equity holders}}{K_e}$

$= \dfrac{50,000}{0.15} = ₹\,3,33,333$

Value of Debt (D) (given)		5,00,000
Total value of the firm (V) = D + S (5,00,000 + 3,33,333)		8,33,333

(ii) Overall cost of capital $(K_o) = K_e\left(\dfrac{S}{V}\right) + K_d\left(\dfrac{D}{V}\right)$

$= 0.15\left(\dfrac{3,33,333}{8,33,333}\right) + 0.10\left(\dfrac{5,00,000}{8,33,333}\right)$

$= \dfrac{1}{8,33,333}\left[50,000 + 50,000\right] = 12.00\%$

Or, $K_0 = \dfrac{EBIT}{V} = \dfrac{1,00,000}{8,33,333} = 12.00\%$

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1.2.2 MODIGLIANI-MILLER (MM) APPROACH

▪ The NOI approach is definitional or conceptual and lacks behavioural significance.

▪ It does not provide operational justification for irrelevance of capital structure.

▪ However, Modigliani-Miller (MM) approach provides behavioural justification for constant overall cost of capital and therefore, total value of the firm.
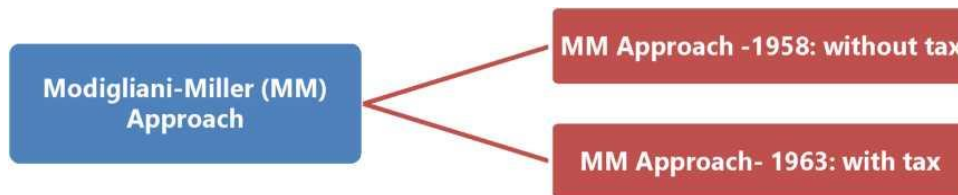
MM APPROACH - 1958: WITHOUT TAX:

This approach describes, in a perfect capital market where there is no transaction cost and no taxes, the value and cost of capital of a company remain unchanged irrespective of change in the capital structure. This approach is based on further following additional assumptions:

▪ Capital markets are perfect. All information is freely available and there are no transaction costs.

▪ All investors are rational.

▪ Firms can be grouped into 'Equivalent risk classes' on the basis of their business risk.

▪ Non-existence of corporate taxes.

Based on the above assumptions, Modigliani-Miller approach derived the following three propositions:

(i) Total market value of a firm is equal to its expected net operating income divided by the discount rate appropriate to its risk class decided by the market.

> Value of levered firm (V_g) = Value of unlevered firm (V_u)
>
> Value of a firm = $\dfrac{\text{Net Operating Income (NOI)}}{K_0}$

(ii) A firm having debt in its capital structure has higher cost of equity than an unlevered firm. The cost of equity will include risk premium for the financial risk. The cost of equity in a levered firm is determined as under:

$$K_e = K_o + (K_o - K_d)\frac{Debt}{Equity}$$

(iii) The structure of the capital (financial leverage) does not affect the overall cost of capital. The cost of capital is only affected by the business risk.
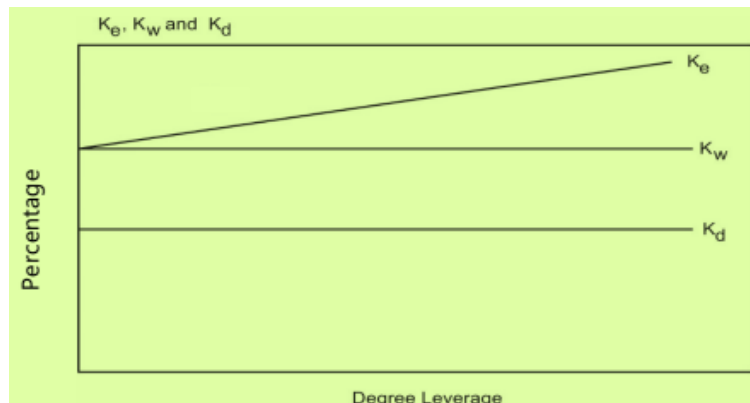
- It is evident from the above diagram that the average cost of the capital (Kw) is constant and is not affected by leverage.

- The operational justification of Modigliani-Miller hypothesis is explained through the functioning of the arbitrage process and substitution of corporate leverage by personal leverage.

- Arbitrage refers to buying asset or security at lower price in one market and selling it at a higher price in another market.

- As a result, equilibrium is attained in different markets.

- This is illustrated by taking two identical firms of which one has debt in the capital structure while the other does not.

- Investors of the firm whose value is higher will sell their shares and instead buy the shares of the firm whose value is lower.

- They will be able to earn the same return at lower outlay with the same perceived risk or lower risk.

- They would, therefore, be better off.

- The value of the levered firm can neither be greater nor lower than that of an unlevered firm according to this approach. The two must be equal.

- There is neither advantage nor disadvantage in using debt in the firm's capital structure.

- This approach considers capital structure of a firm as a whole pie divided into equity, debt and other securities.

- No matter how the capital structure of a firm is divided (among debt, equity etc.), there is a conservation of investment value.

- Since the total investment value of a corporation depends upon its underlying profitability and risk, it is invariant with respect to relative changes in the firm's financial capitalisation.

- According to MM hypothesis, since the sum of the parts must be equal to the whole, therefore, regardless of the financing mix, the total value of the firm stays the same.

SHORTCOMING OF MM APPROACH:

Arbitrage process will fail to work because of

1. Imperfections in capital market

2. Existence of transaction cost

3. **Presence of corporate income taxes** - The major limitation of M – M hypothesis is the existence of corporate taxes. Since the interest charges are tax deductible, a levered firm will have a lower cost of debt due to tax advantage when taxes exist.

MM APPROACH-1963: WITH TAX

- Modigliani and Miller later recognised the importance of the existence of corporate taxes.
- Accordingly, they agreed that the value of the firm will increase or the cost of capital will decrease with the use of debt due to tax deductibility of interest charges. Thus, the optimum capital structure can be achieved by maximising debt component in the capital structure. According to this approach, value of a firm can be calculated as follows:

Value of Unlevered firm (Vu)= $\dfrac{\text{EBIT (1-T)}}{K0}$

> Apply same formula for NOI approach

Where, EBIT = Earnings before interest and taxes

Ko = Overall cost of capital

t = Tax rate.

Value of levered firm (V$_L$) = Value of Unlevered firm + Present value of tax shield on interest

Value of levered firm (V$_L$) = Value of Unlevered firm + (debt x tax rate)

Note : The interest tax shields increases the cashflows available to the investors of the levered firm, thus, increases the value of levered firm to the extent of present value of tax shield on interest.

Assuming permanent use of debt funds, the PV of interest tax shield can be calculated using the formula of perpetuity.

Present value of tax shield on interest $= \dfrac{\text{tax rate x Interest rate x debt funds}}{\text{interest rate}}$

Value of equity = value of firm – value of debt

PROBLEM : 4

(When value of levered firm is more than the value of unlevered firm)

There are two companies N Ltd. and M Ltd., having same earnings before interest and taxes (EBIT) of ₹20,000. M Ltd. is a levered company having a debt of ₹1,00,000 @ 7% rate of interest. The cost of equity of N Ltd. is 10% and of M Ltd. is 11.50%.

COMPUTE how arbitrage process will be carried on?   **(Study Material)**

SOLUTION : 4

	Company	
	M Ltd.	**N Ltd.**
EBIT (NOI)	₹ 20,000	₹ 20,000
Debt (D)	₹1,00,000	--
K$_e$	11.50%	10%
K$_d$	7%	--

Value of equity (S)   = $\dfrac{\text{NOI - Interest}}{\text{Cost of equity}}$

S_M = $\dfrac{20,000 - 7,000}{11.50\%}$ = ₹ 1,13,043

S_N = $\dfrac{20,000}{10\%}$ = ₹ 2,00,000

Value of Firm (V)   = S + D

V_M = 1,13,043 + 1,00,000 = ₹ 2,13,043

V_N = ₹ 2,00,000

Arbitrage Process:

If you have 10% shares of M Ltd., your value of investment in equity shares is 10% of ₹ 1,13,043 i.e. ₹ 11,304.30

and return will be 10% of (₹20,000 - ₹7,000) = ₹ 1,300.

Alternate Strategy will be:

Sell your 10% shares of levered firm for ₹ 11,304.30 and borrow 10% of levered firm's debt i.e. ₹ 10,000 (10% of ₹1,00,000) and invest the money i.e. 10% in unlevered firm's stock:

Total resources /Money we have = ₹11,304.30 +₹10,000 = ₹21,304.3 and you invest 10% of ₹ 2,00,000 = ₹ 20,000

Surplus cash available with you is = ₹ 21,304.3 - ₹ 20,000 = ₹ 1,304.3

Your return = 10% EBIT of unlevered firm - Interest to be paid on borrowed funds

i.e. = 10% of ₹ 20,000 - 7% of ₹ 10,000 = ₹ 2,000 - ₹' 700 = ₹ 1,300

Now your return remains the same i.e. ₹ 1,300 which you are getting from N Ltd. before investing in M Ltd. but still you have ₹ 1,304.3 excess money available with you. Hence, you are better off by doing arbitrage.

In the above example you have not invested entire amount received from "sale of shares of levered company plus amount borrowed". You maintained same level of earning and reduced investment. Alternatively, you could have invested entire amount in unlevered company. In that case your annual earnings would have increased. An example for the same is as follows:

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PROBLEM : 5

(When value of unlevered firm is more than the value of levered firm.)

There are two companies U Ltd. and L Ltd., having same NOI of ₹ 20,000 except that L Ltd. is a levered company having a debt of ₹ 1,00,000 @ 7% and cost of equity of U Ltd. & L Ltd. are 10% and 18% respectively.

COMPUTE how arbitrage process will work.   **(Study Material)**

SOLUTION : 5

Particulars	Company	
	U Ltd.	**L Ltd.**
NOI (EBIT)	₹ 20,000	₹ 20,000
Debt (D)	-	₹ 1,00,000
K_d	-	7%
K_e	10%	18%
Value of equity capital (s) $\left(\dfrac{\text{EBIT-Interest}}{K_e}\right)$	₹ 2,00,000 $\left(\dfrac{20,000}{0.10}\right)$	₹ 72,222 $\left(\dfrac{20,000 - 7,000}{0.18}\right)$
Total value of the firm (V) = S + D	₹ 2,00,000	₹ 1,72,222 (₹ 72,222 + ₹ 1,00,000)

Arbitrage Process:

If you have 10% shares of unlevered firm i.e. investment of 10% of ₹2,00,000 = ₹ 20,000 and Return @ 10% on ₹20,000. Investment will be 10% of earnings available for equity i.e. 10% x ₹ 20,000 = ₹ 2,000.

Alternative strategy will be :

Sell your shares in unlevered firm for ₹ 20,000 and buy 10% shares of levered firm's equity plus debt.

10% equity of levered firm   ₹ 7,222

10% debt of levered firm   ₹ 10,000

Total investment in levered firm   ₹ 17,222

Your resources are ₹20,000

Surplus cash available = Surplus - Investment = ₹ 20,000 - ₹17,222 = ₹ 2,778

Your return on investment is:

7% on debt of ₹ 10,000   ₹ 700

10% on equity i.e. 10% of earnings available for equity holders (10% x ₹ 13,000)   ₹ 1,300

Total return   ₹ 2,000

In both the cases the return received is ₹ 2,000 and still you have excess cash of ₹ 2,778.

Hence, you are better off by doing arbitrage i.e. you will start selling unlevered company shares and buy levered company's shares thereby pushing down the value of shares of unlevered firm and increasing the value of levered firm till equilibrium is reached.

In the above example we have not invested entire amount received from "sale of shares of Unlevered company". We also have the same level of earning along with reduced investment. Alternatively, we could have invested entire amount in Levered company. In that case annual earnings would have increased. An example for the same is as follows:

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1.2.3 THE TRADE-OFF THEORY

- The trade-off theory of capital structure refers to the idea that a company chooses how much debt finance and how much equity finance to use by balancing the costs and benefits.

- Trade-off theory of capital structure basically **entails offsetting the costs of debt against the benefits of debt.**

- Trade-off theory of capital structure primarily deals with **two concepts –**

  ⇨   cost of financial distress and

  ⇨   agency costs.

- An important purpose of the trade-off theory of capital structure is to explain the fact that corporations usually are financed partly with debt and partly with equity.

- There is an **advantage** to financing with debt - the **tax benefits** of debt.

- There is a **cost** of financing with debt - the costs of **financial distress** including bankruptcy costs of debt and non-bankruptcy costs (e.g. staff leaving, suppliers demanding disadvantageous payment terms, bondholder/ stockholder infighting, etc).

- The marginal benefit of further increases in debt declines as debt increases, while the marginal cost increases, so that a firm that is optimizing its overall value will focus on this trade-off when choosing how much debt and equity to use for financing.

- Modigliani and Miller in 1963 introduced the tax benefit of debt.

- Later work led to an optimal capital structure which is given by the trade-off theory.

- According to Modigliani and Miller, the attractiveness of debt decreases with the personal tax on the interest income.

- A **firm experiences financial distress** when the firm is **unable to cope with the debt holders' obligations**. If the firm continues to fail in making payments to the debt holders, the firm can even be insolvent.

- The **first element of Trade-off theory of capital structure**, considered as the cost of debt is usually **the financial distress costs or bankruptcy costs of debt.**

- The **direct** cost of financial distress refers to the cost of insolvency of a company.

- Once the proceedings of insolvency start, the assets of the firm may be needed to be sold at **distress price**, which is generally much lower than the current values of the assets.

- A huge amount of administrative and **legal costs** is also associated with the insolvency.

- Even if the company is not insolvent, the financial distress of the company may include a number of **indirect costs** like - cost of employees, cost of customers, cost of suppliers, cost of investors, cost of managers and cost of shareholders.

- The firms may often experience a dispute of interests among the management of the firm, debt holders and shareholders.

- These disputes generally give birth to agency problems that in turn give rise to the agency costs.

- The agency costs may affect the capital structure of a firm.
- There may be two types of conflicts –
    1. shareholders-managers conflict and
    2. shareholders-debt holders conflict.
- The introduction of a dynamic Trade-off theory of capital structure makes the predictions of this theory a lot more accurate and reflective of that in practice.
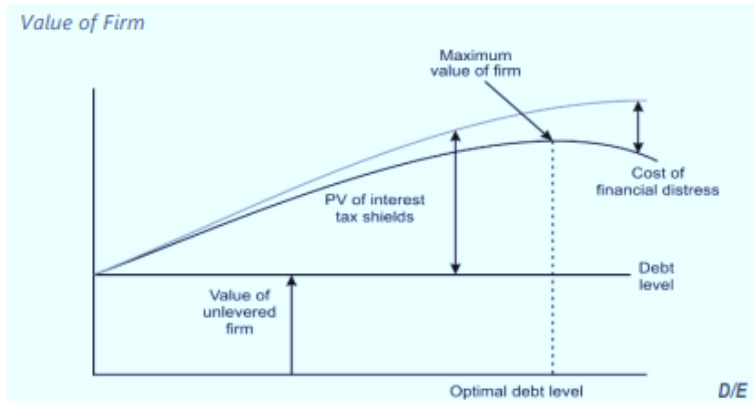
- As the Debt-equity ratio (i.e. leverage) increases, there is a trade-off between the interest tax shield and bankruptcy, causing an optimum capital structure.

2. OPTIMAL CAPITAL STRUCTURE

Objective of financial management is to **maximize wealth**.

Therefore, one should choose a capital structure which maximizes wealth.

For this purpose, following analysis should be done:

1) **EBIT-EPS-MPS analysis:**
    - Chose a capital structure which maximizes market price per share. For that, start with same EBIT for all capital structures and calculate EPS.
    - Thereafter, either multiply EPS by price earning ratio or divide it by cost of equity to arrive at MPS.

2) **Indifference Point analysis:**
    - In above analysis, we have considered value at a given EBIT only.
    - What will happen if EBIT changes?
    - Will it change your decision also?
    - To answer this question, you can do indifference point analysis.

3) **Financial Break-Even Point (BEP) analysis:**
    - With change in capital structure, financial risk also changes.
    - Though this risk has already been considered in PE ratio or in cost of equity in point one above, but one may calculate and consider it separately also by calculating Financial BEP.

PROBLEM : 6

Suppose that a firm has an all equity capital structure consisting of ₹ 1,00,000 ordinary shares of ₹ 10 per share. The firm wants to raise ₹ 2,50,000 to finance its investments and is considering three alternative methods of financing - (i) to issue 25,000 ordinary shares at ' 10 each, (ii) to borrow ₹ 2,50,000 at 8 per cent rate of interest,

to issue 2,500 preference shares of ₹ 100 each at an 8 per cent rate of dividend. If the firm's earnings before interest and taxes after additional investment are ₹ 3,12,500 and the tax rate is 50 per cent, FIND the effect on the earnings per share under the three financing alternatives.   (Study Material)

SOLUTION : 6

EPS under alternative financing plans:

Particulars	Equity Financing (₹)	Debt Financing (₹)	Preference Financing (₹)
EBIT	3,12,500	3,12,500	3,12,500
Less: Interest	0	20,000	0
PBT	3,12,500	2,92,500	3,12,500
Less: Taxes	1,56,250	1,46,250	1,56,250
PAT	1,56,250	1,46,250	1,56,250
Less: Preference dividend	0	0	20,000
Earnings available to ordinary shareholders	1,56,250	1,46,250	136,250
Shares outstanding	1,25,000	1,00,000	1,00,000
EPS	1.25	1.46	1.36

The firm is able to maximize the earnings per share when it uses debt financing.

Though the rate of preference dividend is equal to the rate of interest, EPS is high in case of debt financing because interest charges are tax deductible while preference dividends are not.

With increasing levels of EBIT, EPS will increase at a faster rate with a high degree of leverage.

We know that market price per share is equal to earning per share multiplied by price earning (PE) ratio.

If PE ratio is same for all three plans, then the plan which has highest EPS will also have highest MPS and it will be selected.

On the other hand, if PE ratio for equity plan is 10 times, for debt plan it is 8 times and for preference plan it is 7 times then:

EPS	1.25	1.46	1.36
PE ratio	x10	x8	x7
MPS	12.50	11.68	9.52

Now despite of lower EPS, equity plan will be selected because it has highest MPS.

However, if a company is not able to earn a rate of return on its assets higher than the interest rate (or the preference dividend rate), debt (or preference financing) will have an adverse impact on EPS.

Suppose the firm in illustration above has an EBIT of '75,000, then EPS under different methods will be as follows:

EPS under alternative financing methods: Unfavourable EBIT:

Particulars	Equity Financing (₹)	Debt Financing (₹)	Preference Financing (₹)
EBIT	75,000	75,000	75,000
Less: Interest	0	20,000	0
PBT	75,000	55,000	75,000
Less: Taxes	37,500	27,500	37,500
PAT	37,500	27,500	37,500
Less: Preference dividend	0	0	20,000
Earnings available to ordinary	37,500	27,500	17,500
Shareholders			
Shares outstanding	1,25,000	1,00,000	1,00,000
EPS	0.30	0.275	0.175

It is obvious that under unfavourable conditions i.e., when the rate of return on the total assets is less than the cost of debt, the earnings per share will fall with the degree of leverage.

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2.1 FINANCIAL BREAK-EVEN POINT (BEP) AND INDIFFERENCE POINT ANALYSIS
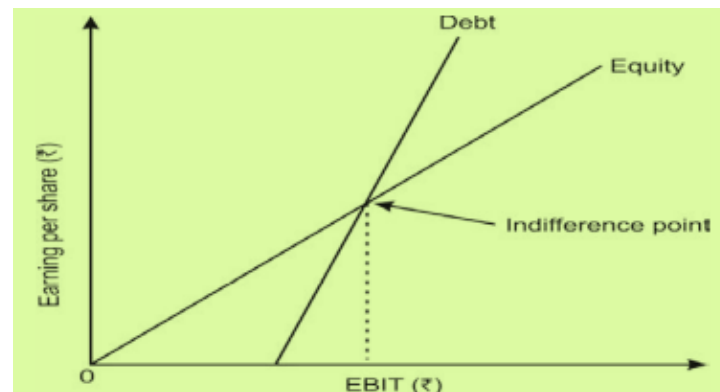
- **Financial break-even point is the minimum level of EBIT needed to satisfy all the fixed financial charges i.e. interests and preference dividends.**

- It denotes the level of EBIT for which the company's **EPS equals zero**.

- Financial breakeven point (BEP) can be calculated as:

- **Financial Break-even point = Interest + Preference dividend / (1 - tax rate)**

- If the EBIT is less than the financial break-even point, then the EPS will be negative but if the expected level of EBIT is more than the break-even point, then more fixed costs financing instruments can be taken in the capital structure, otherwise, equity would be preferred.

- EBIT-EPS break-even analysis is used for determining the appropriate amount of debt a company might carry.

- Another method of considering the impact of various financing alternatives on earnings per share is to prepare the EBIT chart or the range of Earnings chart.

- This chart shows the likely EPS at various probable EBIT levels.

- Thus, under one particular alternative, EPS may be ' 2 at a given EBIT level.

- However, the EPS may go down if another alternative of financing is chosen even though the EBIT remains at the same level.

- At a given EBIT, earnings per share under various alternatives of financing may be plotted.

- A straight line representing the EPS at various levels of EBIT under the alternative may be drawn.

- Wherever this line intersects, it is known as **break-even point**.

- This point is a useful guide in formulating the capital structure.

- This is known as EPS equivalency point or indifference point since this shows that, between the two given alternatives of financing (i.e., regardless of leverage in the financial plans), EPS would be the same at the given level of EBIT.

- The equivalency or indifference point can also be calculated algebraically in the following manner:

$$\frac{(EBIT-I_1)(1-t)}{E_1} = \frac{(EBIT-I_2)(1-t)}{E_2}$$

Where,

|		
EBIT	=	Indifference point
E_1	=	Number of equity shares in Alternative 1
E_2	=	Number of equity shares in Alternative 2
I_1	=	Interest charges in Alternative 1
I_2	=	Interest charges in Alternative 2

T = Tax-rate

- Just keep in mind that if amount of equity share capital is same under two financial plans, then one of the following two situations will arise:

1. **NO INDIFFERENCE POINT:** If after tax cost of the source other than equity shares is **not same** under both plans then there will be no indifference point between the two. Because one plan will be better than other at all levels of EBIT. For example, if two plans have equity shares of ₹1,00,000 each. Plan 1 has 10% debentures of ₹ 50,000 while plan 2 has 8% Term loan of ₹50,000. Then plan 2 will be better than plan 1 at any level of EBIT and there will be no indifference point.
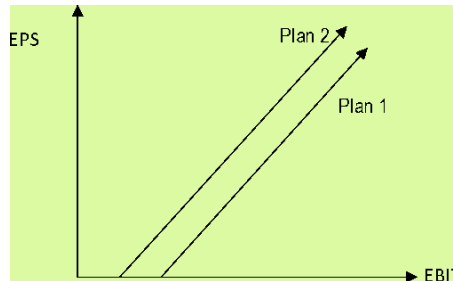
2. **MANY INDIFFERENCE POINTS:** If after tax cost of the source other than equity shares is **same** under both plans then each EBIT will be an indifference point.
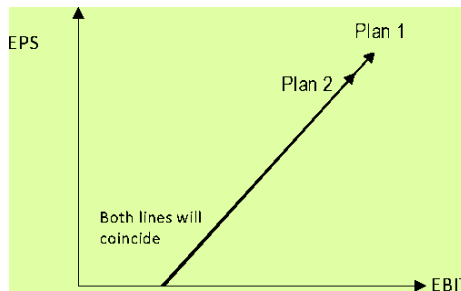
Debt-Equity Indifference Point

PROBLEM : 7

The following data are presented in respect of Quality Automation Ltd.:

	Amount (₹)
Profit before interest and tax	52,00,000
Less: Interest on debentures @ 12%	12,00,000
Profit before tax	40,00,000
Less: Income tax @ 50%	20,00,000
Profit After tax	20,00,000
No. of equity shares (of ' 10 each)	8,00,000
EPS	2.5
PE Ratio	10
Market price per share	25

The company is planning to start a new project requiring a total capital outlay of ₹ 40,00,000. You are informed that a debt equity ratio (D/D+E) higher than 35%, pushes the Ke up to 12.5%, means reducing the PE ratio to 8 and rises the interest rate on additional amount borrowed to 14%. FIND OUT the probable price of share if:

(i)   the additional funds are raised as a loan.

(ii)   the amount is raised by issuing equity shares.

(Note : Retained earnings of the company is ₹ 1.2 crore)

(Study Material + Similar Question in Nov. 2023 Exam - 10 Marks)

SOLUTION : 7

In this question, EBIT after proposed extension is not given. Therefore, we can assume that existing return on capital employed will be maintained.

Working notes:

1. $\text{Return on Capital Employed} = \dfrac{\text{EBIT}}{\text{Capital Employed}} = \dfrac{₹\,52,00,000}{₹\,3,00,00,000} = 17.33\%$

    Capital Employed = Debt + Equity
    = ₹ 1,00,00,000 + (₹ 80,00,000 + ' 1,20,00,000)
    = ₹3,00,00,000

2. Proposed EBIT = Proposed Capital Employed x Return on capital employed
    = (₹ 3,00,00,000 + ₹ 40,00,000) x 17.33% = ₹58,92,200

    (If you take return on capital employed in full digits then accurate EBIT will be ₹58,93,333.)

3. $\text{Debt Equity Ratio} = \dfrac{\text{Debt}}{\text{Debt} + \text{Equity}}$

    Option l: Loan option :

    Debt = ₹ 1,00,00,000 + ₹ 40,00,000 = ₹1,40,00,000

    Equity = ₹ 2,00,00,000

    $\text{Debt Equtiy ratio} = \dfrac{1\ cr.}{1\ cr. + 2.4\ cr.} = 29.41\%$

    Debt equity ratio has crossed the limit of 35%, hence, PE ratio in this case will be 8 times and additional borrowing will be at the rate of 14%.

    Option 2: Equity option

    Debt = ₹ 1,00,00,000

    Equity = ₹ 2,00,00,000 + ₹ 40,00,000 = ₹ 2,40,00,000

    $\text{Debt Equtiy ratio} = \dfrac{1\ cr.}{1\ cr. + 2.4\ cr.} = 29.41\%$

    Debt equity ratio has not crossed the limit of 35% hence PE ratio in this case will remain at 10 times.

4. Number of equity shares to be issued in case of equity option @ ₹25 per share = ₹ 40,00,000 / ₹25 = 1,60,000

Calculation of EPS and MPS under two financial options

Particulars	Financial Options	
	Option I 14% additional loan of 40,00,000 (₹)	Option II 8,00,000 equity shares @ ₹ 10 i.e 1,60,000 equity shares @ ₹ 25 (₹)
Profit before interest and Tax (PBIT)	58,92,200	58,92,200
Less: Interest on old debentures @ 12%	12,00,000	12,00,000
Less: Interest on additional loan (new) @ 14% on ' 40,00,000	5,60,000	Nil
Profit before tax	41,32,200	46,92,000
Less: Taxes @ 50%	20,66,100	23,46,100
Earnings for equity shareholders (EAT/Profit after tax)	20,66,100	23,46,100
Number of Equity Shares	8,00,000	9,60,000
Earnings per Share (EPS)	2.58	2.44

Price/ Earnings ratio	8	10
Market price per share (MPS)	20.66	24.44

Decision: Though loan option has higher EPS but equity option has higher MPS therefore company should raise additional fund through equity option.

PROBLEM : 8

Aaina Ltd. is considering a new project which requires a capital investment of ₹ 9 crores. Interest on term loan is 12% and Corporate Tax rate is 30%.

CALCULATE the point of indifference for the project considering the Debt Equity ratio insisted by the financing agencies being 2 : 1.   (Study Material)

SOLUTION : 8

The capital investment can be financed in two ways i.e.

By issuing equity shares only worth₹9 crore or

By raising capital through taking a term loan of ' 6 crores and ₹3 crores through issuing equity shares (as the company has to comply with the 2 : 1 Debt Equity ratio insisted by financing agencies).

In first option interest will be Zero and in second option the interest will be ₹72,00,000

Point of Indifference between the above two alternatives =

$$\frac{EBIT \times (1-t)}{No.\,of\,equity\,shares\,(N_1)} = \frac{(EBIT - Interest) \times (1-t)}{No.\,of\,equity\,shares\,(N_2)}$$

Or,
$$\frac{EBIT\,(1-0.30)}{90,00,000\,shares} = \frac{(EBIT - ₹\,72,00,000) \times (1-0.30)}{30,00,000\,shares}$$

Or, $0.7\,EBIT$ = $2.1\,EBIT - ₹\,1,51,20,000$

        $EBIT$ = $₹\,1,08,00,000$

EBIT at point of Indifference will be ₹1.08 crore.

(The face value of the equity shares is assumed as ₹ 10 per share. However, indifference point will be same irrespective of face value per share).

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PROBLEM : 9

Xylo Ltd. is considering two alternative financing plans as follows:

Particulars	Plan - A (₹)	Plan - B (₹)
Equity shares of ₹ 10 each	8,00,000	8,00,000
Preference Shares of ₹100 each	-	4,00,000
12% Debentures	4,00,000	-
	12,00,000	12,00,000

The indifference point between the plans is ₹ 4,80,000. Corporate tax rate is 30%. CALCULATE the rate of dividend on preference shares.   (Study Material + Nov. 2020 - RTP)

SOLUTION : 9

Computation of Rate of Preference Dividend

$$\frac{(EBIT - Interest)\ (1-t)}{No.\ of\ Equity\ Shares\ (N_1)} = \frac{EBIT\ (1-t) - Preference\ Dividend}{No.\ of\ Equity\ Shares\ (N_2)}$$

$$\frac{(₹\ 4,80,000 - ₹\ 48,000) \times (1 - 0.30)}{80,00,000\ shares} = \frac{₹\ 4,80,000\ (1 - 0.30) - Preference\ Dividend}{80,00,000\ shares}$$

$$\frac{₹\ 3,02,400}{80,00,000\ shares} = \frac{₹\ 3,36,000 - Preference\ Dividend}{80,00,000\ shares}$$

₹ 3,02,400 = ₹ 3,36,000 − Preference Dividend

Preference Dividend = ₹ 3,36,000 − ₹ 3,02,400 = ₹ 33,600

Rate of Dividend $= \dfrac{Preference\ Dividend}{Preference\ share\ capital} \times 100$

$$= \frac{₹\ 33,600}{4,00,000} \times 100 = 8.4\%$$

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PROBLEM : 10

Ganapati Limited is considering three financing plans. The key information is as follows:

a) Total investment to be raised is ₹ 2,00,000.

b) Plans of Financing Proportion:

Plans	Equity	Debt	Preference Shares
A	100%	-	-
B	50%	50%	-
C	50%	-	50%

c) **Cost of debt**   8%

   Cost of preference shares   8%

d) **Tax rate**   50%

e) Equity shares of the face value of ₹ 10 each will be issued at a premium of ₹ 10 per share.

f) Expected EBIT is ₹ 80,000.

You are required to DETERMINE for each plan:

(i)   Earnings per share (EPS)

(ii)   The financial break-even point

(iii)   Indicate if any of the plans dominate and compute the EBIT range among the plans for indifference.

(Study Material + Oct. 2021 – MTP – 10 Marks + Similar Question in Nov. 2020 Exam – 10 Marks)

SOLUTION : 10

(i)   **Computation of Earnings per share (EPS)**

Plans	A (₹)	B (₹)	C (₹)
Earnings before interest and tax (EBIT)	80,000	80,000	80,000
Less: Interest charges	—	(8,000) (8% x ₹1 lakh)	—
Earnings before tax (EBT)	80,000	72,000	80,000
Less: Tax (@ 50%)	(40,000)	(36,000)	(40,000)
Earnings after tax (EAT)	40,000	36,000	40,000
Less: Preference dividend	—	—	(8,000) (8% x ₹1 lakh)
Earnings available for Equity shareholders (A)	40,000	36,000	32,000
No. of Equity shares (B)	10,000 (₹2 lakh - ₹20)	5,000 (₹1 lakh - ₹20)	5,000 (₹1 lakh - ₹20)
EPS [(A) - (B)]	4	7.20	6.40

ii) Calculation of Financial Break-even point

Financial break-even point = Interest + Preference Dividend/(1-t)

Plan A: Under this plan there is no interest or preference dividend payment hence, the Financial Break-even point will be zero.

Plan B: Under this plan there is an interest payment of ₹ 8,000 and no preference dividend, hence, the Financial Break-even point will be ₹ 8,000 (Interest charges).

Plan C: Under this plan there is no interest payment but an after tax preference dividend of ₹ 8,000 is paid. Hence, the Financial Break- even point will be before tax earnings of ₹ 16,000 (i.e. ₹ 8,000-(1 - 0.5)= ₹ 16,000)

iii) Computation of indifference point between the plans

The indifference between two alternative methods of financing is calculated by applying the following formula:

$$\frac{(EBIT - I_1)(1 - T)}{E_1} = \frac{(EBIT - I_2)(1 - T)}{E_2}$$

I. Indifference point where EBIT of Plan A and Plan B is equal.

$$\frac{(EBIT - 0)(1 - 0.5)}{10,000} = \frac{(EBIT - 8,000)(1 - 0.5)}{5,000}$$

0.5 EBIT (5,000)	=	(0.5 EBIT − 4,000) (10,000)
0.5 EBIT	=	EBIT − 8,000
0.5 EBIT	=	8,000
EBIT	=	₹ 16,000

II. Indifference point where EBIT of Plan A and Plan C is equal.

$$\frac{(EBIT - 0)(1 - 0.5)}{10,000} = \frac{(EBIT - 0)(1 - 0.5) - 8,000}{5,000}$$

$$\frac{0.5\, EBIT}{10,000} = \frac{0.5\, EBIT - 8,000}{5,000}$$

0.25 EBIT	=	0.5 EBIT − 8,000
0.25 EBIT	=	8,000
EBIT	=	₹ 32,000

III. Indifference point where EBIT of Plan B and Plan C are equal.

$$\frac{(EBIT - 8,000)(1 - 0.5)}{5,000} = \frac{(EBIT - 0)(1 - 0.5) - 8,000}{5,000}$$

0.5 EBIT − 4,000	=	0.5 EBIT − 8,000

There is no indifference point between the financial plan B and C.

It can be seen that Financial Plan B dominates Plan C. Since, the financial break-even point of the former is only ₹ 8,000 but in case of latter it is ₹ 16,000.

Further EPS of plan B is the highest.

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