

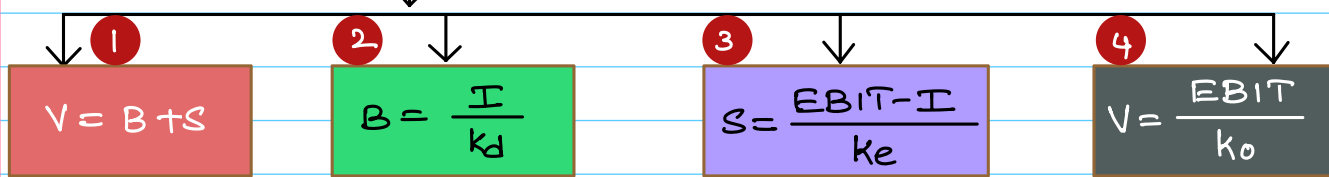
CAPITAL STRUCTURE PLANNING

Learning objectives

- * EBIT - EPS analysis
- * Net income approach (NI approach)
- * Net operating income approach (NOI approach)
- * Traditional approach.
- * Modigliani - Miller approach (MM approach)

Part I

Formulae

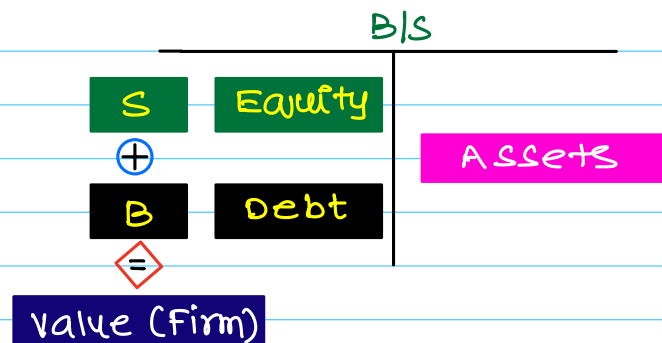


- * V = Value of company
- * B = Value of borrowing/debt
- * S = Value of SH's money/equity
- * k_d = Cost of debt,
- * k_e = Cost of equity
- * k_o = Overall CoE.

Assumptions used

- * There are only 2 sources of finance namely —
 - Equity and (Equity includes retainings as well)
 - Debt (No Preference)
- * Debt is an irredeemable debt
- * No taxes
- * 100% dividend pay-out ratio
- * All investors have same expectations.

Basic Analysis



- * If one wants to buy a house, he should pay for the house and if one wants to buy a car, it shall pay for the price of car.
- * Likewise, if a person wants to buy a company, what he should buy?

- He need not pay individually for —

■ All fixed assets like land & buildings, Plant and machinery, intangibles etc

■ All current assets like cash, stock, receivables etc.

Rather he need to pay for value of debt and equity.

- Value here represents the fair value of both the debt and equity.

$$\therefore V = B + S$$

- Value of debt is present value of future interest CFs discounted @ k_d . Here debt is a irredeemable debt and tax is ignored. Therefore, the following shall apply.

$$\therefore B(\text{value of debt}) = \frac{I}{k_d}$$

$$\therefore \text{PV of perpetuity} = \frac{CF_p \cdot a}{RR}$$

- Value of equity is the CFs available to them discounted @ k_e . Since company has no preference shares and taxes, $EBIT - \text{Interest}$ is cash flow available to equity holder.

$$\therefore S = \frac{EBIT - I}{k_e}, \text{ This can be further analysed as under —}$$

$\therefore EBIT - \text{Interest} = EAESH$	$EBIT = XXX$
$\therefore$ Since, as per assumption 100% EAESH is paid as dividends, $EAESH = D$.	$\rightarrow \text{Interest} = (XXX)$
	$EBT = XXX$
	$\rightarrow \text{TAX} = NA$
$\therefore$ Since, every SH has same expectation, same k_e is considered as RR for the discounting purpose.	$EAT = XXX$
	$\rightarrow \text{Pref. div} = NA$
	$EAESH = XXX$

$$\therefore EBIT - \text{Interest} = \text{Dividend} = D$$

$\therefore$ formula is nothing but D/k_e (like said in walter model).

- Value of firm (Centre company) is nothing but the present value of future CFs belonging to both equity and debt together. Since, no preference and tax, EBIT is CF belonging to both equity + debt. Since, both equity and debt are involved, instead of k_e/k_d , overall cost of capital (k_o) is used.

$$\therefore V = \frac{EBIT}{k_o}$$

$\therefore$ Amount that is available to both Equity and debt.

Derivation

'I' is the CF available to debt and 'EBIT-I' is the CF available to equity. CF available to both will be $I + EBIT - I$.

1.

Step 1: Calculation of mv of equity.

$$\begin{aligned} \text{mv of equity} &= \frac{EBIT - I}{k_e} \\ &= \frac{\text{₹}5,00,000 - (\text{₹}20,00,000 \times 10\%)}{0.16} \\ &= \frac{\text{₹}5,00,000 - \text{₹}2,00,000}{0.16} \\ &= \text{₹}18,75,000. \end{aligned}$$

Step 2: Value of firm

$$\begin{aligned} \text{Value of firm (V)} &= B + S = \text{₹}20,00,000 + \text{₹}18,75,000 \\ &= \text{₹}38,75,000. \end{aligned}$$

Step 3: Overall Cost of Capital

$$\begin{aligned} \text{Overall cost of Capital (} k_o \text{)} &= \frac{\text{₹}5,00,000}{\text{₹}38,75,000} \times 100 \\ &= 12.90\%. \end{aligned}$$

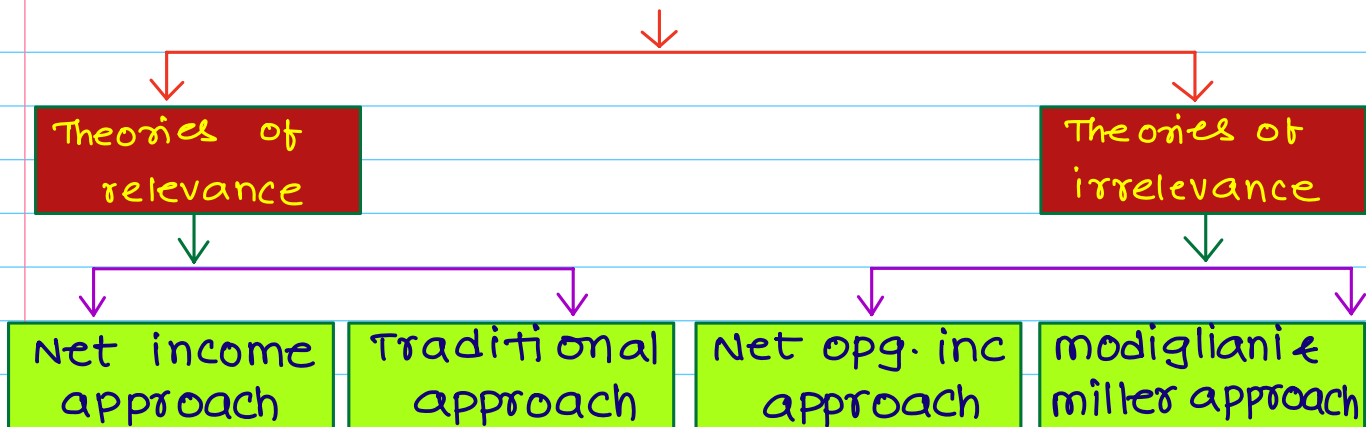
$$\text{Since, } V = \frac{EBIT}{k_o}$$

$$k_o = \frac{EBIT}{V}$$

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Theories of Capital structure planning



Basics

* Two companies are same in all aspects namely-

- Earnings
- Business
- Assets etc

except capital structure will have same value (or) different value is subject matter of the discussion.

* There are 2 opinions as depicted in the chart above.

Net income approach

* This theory is propounded by Durand.

* Proposition is that capital structure affects value of firm.

* As per this theory, _____

* Debt is cheaper than equity due to the following reasons —

- Debt has tax shield
- Debt has less risk since they get fixed cash flow irrespective of any situation.

* company's using more debt into its cap. structure will have better value of its company since overall k_0 is reduced.

* As per this theory the most optimum cap. st is 100% debt and worst CS is 100% equity.

Net operating income approach - NOI model

- * This theory is propounded by Durand.
- * Proposition is that capital structure does not affect the value of firm.
- * As per this theory, _____

* Debt is cheaper than equity due to the following reasons _____

- Debt has tax shield
- Debt has less risk since they get fixed cash flow irrespective of any situation.

* However, use of more debt increases the risk of equity because lower EAT may come due to heavy fixed interest costs. Due to this, risk of equity increases. When risk increases equity will ask more return (k_e).

* Therefore, the net effect is _____

- k_o reduces as the debt component is more in the cap.st.
- k_o increases as the k_e is increased due to more finance risk.

The reduction in k_o is exactly offset by increase in k_e leaving " k_o " unchanged.

Since, the models assume that all firms have same EBIT, sales etc except to its cap.st, $V = \frac{EBIT}{k_o}$.

In this EBIT is constant across any firm. k_o will be constant across any cap.st and therefore VF is unaffected by cap.structure.

Relationship b/w Debt and various variables under both the approaches.

As per NI approach					As per NOI approach				
Debt%	Eq%	k_o	k_e	Vc	D%	Eq%	k_e	k_o	Vc
↑	↓	↓	—	↑	↑	↓	↑	↓	—
↓	↑	↑	—	↓	↓	↑	↓	↑	—
In NI, k_e is assumed as constant.					In NOI, k_o & Vc are assumed as constant.				

Summary of both models is as follows —

* 2 entities are same in all respects except for their capital structures. Hence, the business risk is same for all companies under consideration.

* Under NI approach it is assumed that the investor will have same expectation on k_d & k_e . Hence, from one company to another k_d & k_e individually don't change but k_o will surely change because higher the equity higher the ' k_o '.

* Under NOI approach, it is assumed that the investor will have same k_o irrespective of cap.st, though k_e & k_d may change.

A comprehensive example

Particulars	Co-J	Co-M (Amt ₹)
EBIT	3,00,000	3,00,000
Debt	9,00,000	—
k_d	10%	—
k_e	?	15%
k_o	?	15% (All equity $k_e = k_o$)

I. Using NI approach

As per NI approach,

* k_e is same across any capital structure and any investor.

* k_o is not same because more the debt less the k_o and vice versa.

* value of the firm will be affected by D&E values because if k_o changes, value of firm changes as $V = \frac{EBIT}{k_o}$

Re-arranging information based on NI model

* k_e of 2 cos is assumed as same.

Particulars	Co-J	Co-M (Amt ₹)
EBIT	3,00,000	3,00,000
Debt	9,00,000	—
k_d	10%	—
k_e	*15%	15%
k_o	?	15% (All equity $k_e = k_o$)

Particulars	J Ltd	"₹"	M Ltd
EBIT	3,00,000		3,00,000
(→) Interest (9,00,000 × 10%)	(90,000)		—
EBT	2,10,000		3,00,000
(→) Tax	—		—
EAT/EATSH	2,10,000		3,00,000
k_e	15%		15%
V_E (or) S	14,00,000		20,00,000
B (or) Debt	9,00,000		—
$V = B + S$	23,00,000		20,00,000
$k_o = \frac{EBIT}{V}$	13.04%		15%
∴ $V = \frac{EBIT}{k_o}$			

II. Using NOI approach

* Under NOI approach, ———

- Value of 2 cos will be same irrespective of Cap.St.
- k_e will change across any 2 cos because higher the debt employed, higher the risk to equity and higher will be the k_e .

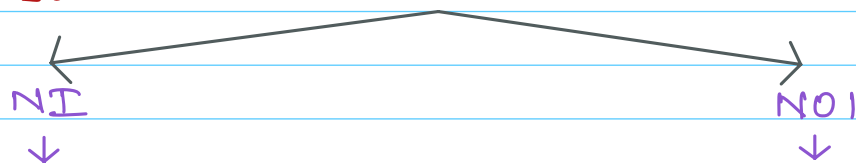
Re-arranging information based on NOI model

Particulars	Co-J	Co-M (Amt ₹)
EBIT	3,00,000	3,00,000
Debt	9,00,000	—
k_d	10%	—
k_e	?	15%
k_o	15%	15% (All equity $k_e = k_o$)
	(Same due to offsetting effect)	

Particulars	J Ltd	"M" Ltd
EBIT	3,00,000	3,00,000
(-) Interest	(90,000)	—
EBT	2,10,000	3,00,000
(-) Tax	—	—
EAT/FAESH	2,10,000	3,00,000
k_o	15%	15%
$V = EBIT/k_o$	20,00,000	20,00,000
$S = V - B$	11,00,000	20,00,000
$k_e = \frac{EBIT - I}{S}$	19.09%	15%

Summary of solution:

* J & M Ltd are same in all respects except for the Cap.st.



At different Cap.st,
 k_e is same. Hence, in
 NI, J & M k_e is 15%.

At all Cap.st, k_o is
 same. Hence, for J Ltd &
 M Ltd, k_o is 15% under
 NOI.

* J Ltd is levered (having debt) and M Ltd is an unlevered firm (No Debt).

* Due to use of debt, being a cheaper source of finance, ($k_d = 10\%$, $k_e = 15\%$) J Ltd k_o reduces from 15% to 13.04% under NI model

- * When k_0 reduces, value increases. Hence, J Ltd is having ₹3L extra value than M Ltd under M model.
- * Thus, it is proved that Cap.st affects value of a firm. Firm having debt will have more value.
- * NOI says that Cap.st will not affect the value of the firm. Hence, J & M Ltd both have same 20L value as both have same EBIT & k_0 .
- * J Ltd uses debt, a cheaper source of finance ($k_d = 10\%$, $k_e = 15\%$). This pulls k_0 downwards. At the same time, use of debt increases finance risk which in turn increases k_e from 15% to 19.09%, which pulls k_0 upwards. The earlier downward pull and this upward pull offsets exactly leaving k_0 unchanged.
- * When k_0 doesn't change, the value remains constant.

2.

Step 1: Calculation of value of firm.

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a) Value of debt = ₹ 5,00,000

b) Value of equity = ₹ 3,33,333

$$S = \frac{EBIT - I}{k_e}$$

k_e

$$= \frac{₹1,00,000 - (5,00,000 \times 10\%)}{15\%}$$

$$= \frac{₹50,000}{15\%}$$

c) Total value of firm = ₹ 8,33,333

Step 2: Calculation of k_0 (WACC)

Sources	Amount	prop	Cost	Wt. Cost
Debt	₹5,00,000	0.60	10%	6.00
Equity	₹3,33,333	0.40	15%	6.00
	₹8,33,333			12.00%

Step 2 (Alternative)

$$V = \frac{EBIT}{k_0}; \quad ₹8,33,333 = \frac{₹1,00,000}{k_0}; \quad k_0 = 12\%$$

Traditional approach

3. Under the traditional approach, the firm shall select such a capital structure out of various combinations whose k_0 is low.

option	k_d	k_e	w_d	w_e	$k_0 = w_d k_d + w_e k_e$
1	11	13	0	1	13% $(0 \times 11) + (1 \times 13)$
2	11	13	10%	90%	12.80% $(0.10 \times 11) + (0.90 \times 13)$
3	11.60	14	20%	80%	13.52% $(0.20 \times 11.6) + (0.80 \times 14)$
4	12.00	15	30%	70%	14.10% $(0.3 \times 12) + (0.7 \times 15)$
5	13	16	40%	60%	14.80% $(0.4 \times 13) + (0.6 \times 16)$
6	15	18	50%	50%	16.50% $(0.5 \times 15) + (0.5 \times 18)$
7	18	20	60%	40%	18.80% $(0.6 \times 18) + (0.4 \times 20)$

Plan II is better because overall cost of capital is low.

4. Step 1: Calculation of value of firm

Particular	Amount(₹)
EBIT	5,00,000
(-) Interest $(₹15,00,000 \times 10\%)$	(1,50,000)
EBT	3,50,000
(-) Tax	-
EAT (or) EAT	3,50,000
k_0	15%
$V = \text{EBIT} / k_0$ $(5,00,000 / 15\%)$	33,33,333
B	15,00,000
S (Eq. value) $(V - B)$	18,33,333

Step 2: Calculation of k_e

$$S = \frac{EBIT - I}{k_e} ; k_e = \frac{EBIT - I}{S}$$

$$k_e = \frac{3,50,000}{18,33,333} \times 100$$

$$= 19.09\%$$

5.

Given information

Particular	Alpha Ltd	Beta Ltd
Equity (W_e)	50%	80%
Debt (W_d)	50%	20%
Interest cost	8%	8%
k_0	18%	18%

Since it is clearly given that NOI shall be considered, this is a question on NOI model.

FOR ALPHA LTD

Step 1: Calculation of Value of firm

Particular	Amount (₹)
EBIT	3,60,000
k_0	18%
$V(F) = EBIT / k_0$	20,00,000
B = Debt Value (20,00,000 × 50%)	10,00,000
S = Equity Value (20,00,000 × 50%)	10,00,000

Step 2: Calculation of return if holding is 2%

Particular	Amount (₹)
EBIT	3,60,000
(-) Interest (10,00,000 × 8%)	(80,000)
EAEH	2,80,000
Return to a holder with 2%	5,600
(₹2,80,000 × 2%)	

Step 3: Calculation of implied ROR (k_e)

$$S = \frac{EBIT - I}{k_e} \text{ (or) } k_e = \frac{EBIT - I}{S}$$

$$= \frac{₹2,80,000}{₹10,00,000} \times 100$$

$$= 28\%$$

FOR BETA Ltd

Step 1: Calculation of Debt and equity values.

As per NOI approach, both firms will have same k_0 irrespective of their Capital structures.

Particulars	Amount (₹)
-------------	------------

EBIT	3,60,000
------	----------

k_0	18%
-------	-----

$V(F) = EBIT / k_0$	20,00,000
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$B = \text{Debt Value } (20,00,000 \times 20\%)$	4,00,000
--	----------

$S = \text{Equity Value } (20,00,000 \times 80\%)$	16,00,000
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Step 2: Calculation of EBIT-I

Particulars	Amount (₹)
-------------	------------

EBIT	3,60,000
------	----------

$\rightarrow \text{Interest } (\text{₹} 4,00,000 \times 8\%)$	(32,000)
---	----------

EBIT-Int	3,28,000
----------	----------

$$k_e = \frac{\text{EBIT} - I}{S} = \frac{3,28,000}{16,00,000} \times 100 = 20.50\%$$

Conclusion:

The k_e of alpha Ltd is higher than k_e of beta Ltd because, Alpha Limited is using more debt funds in its Cap structure.

As per NOI approach, as the company uses more debt in its capital structure, risk passes on to the equity and eventually k_e raises.

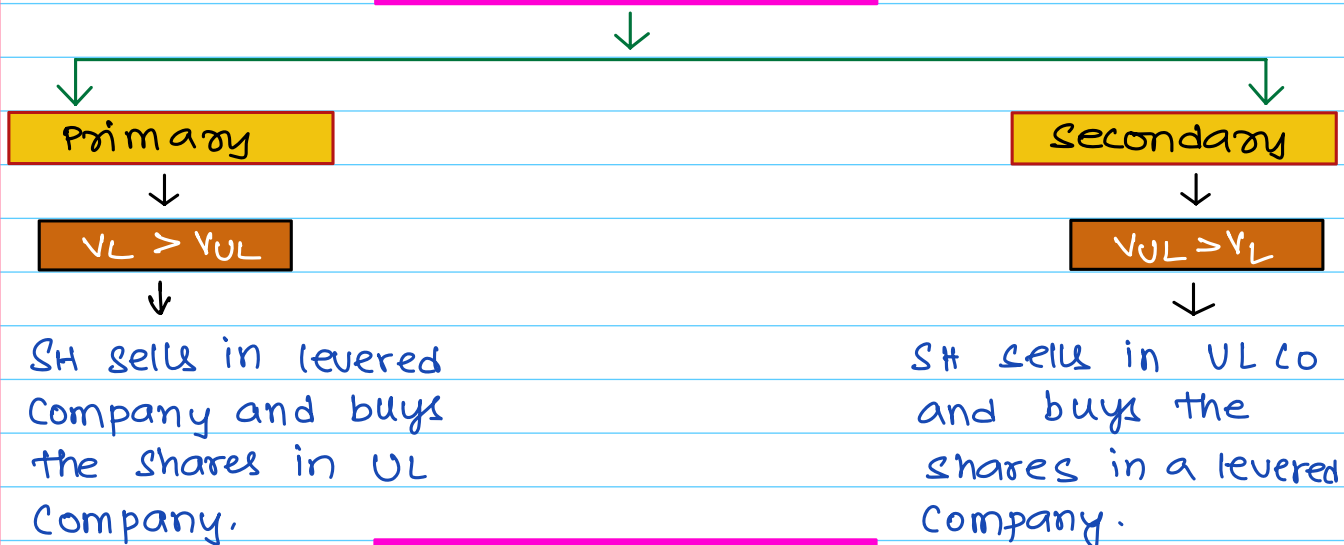
modigliani and miller approach

1. Basics

- * Propounded by modigliani & miller.
- * Proposition is that cap. str do not influence the firms valuation. Therefore, this is a theory of irrelevance.
- * Two companies alike in all aspects (return, risk, size etc) except cap. str cannot have two different values.
- * Even if they have different values, their values will be made equal due to operation of a process called "Arbitrage process".
- * What is Arbitrage process?
 - It is a process of buying in a cheaper market and selling in costlier market to make a riskless gain.
 - Due to this process, demand for the product in cheaper market increases thereby increasing the price (or) supply for the product in the costlier market increases thereby decreasing its price.
 - After some time equilibrium in price will be achieved. Arbitrage process will then stop.
- * mm says that, when two firms have different values, the SH sells the shares in highly valued firm and buys the shares in lower valued firm. As a result, the demand for under valued shares increases thereby increasing its value and supply of highly valued firm increases thereby decreasing its value. After sometime equilibrium is achieved and arbitrage exhausts.

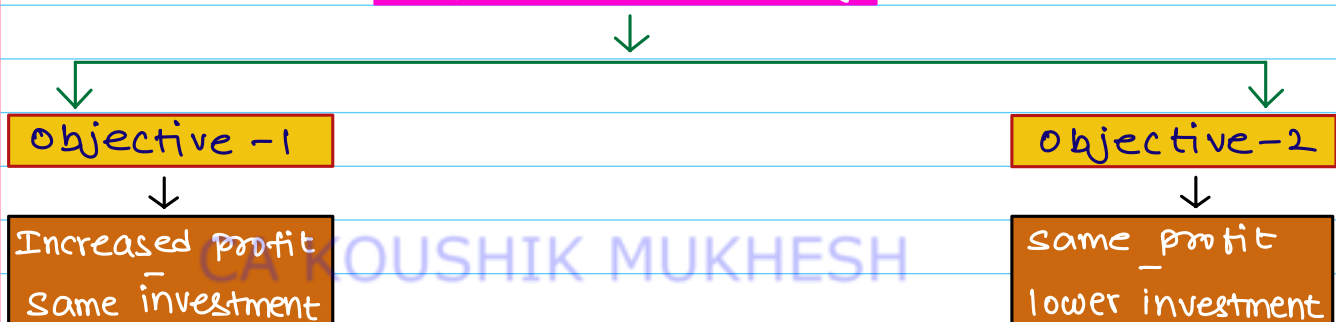
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Types of Arbitrages



*

Objective of Arbitrage



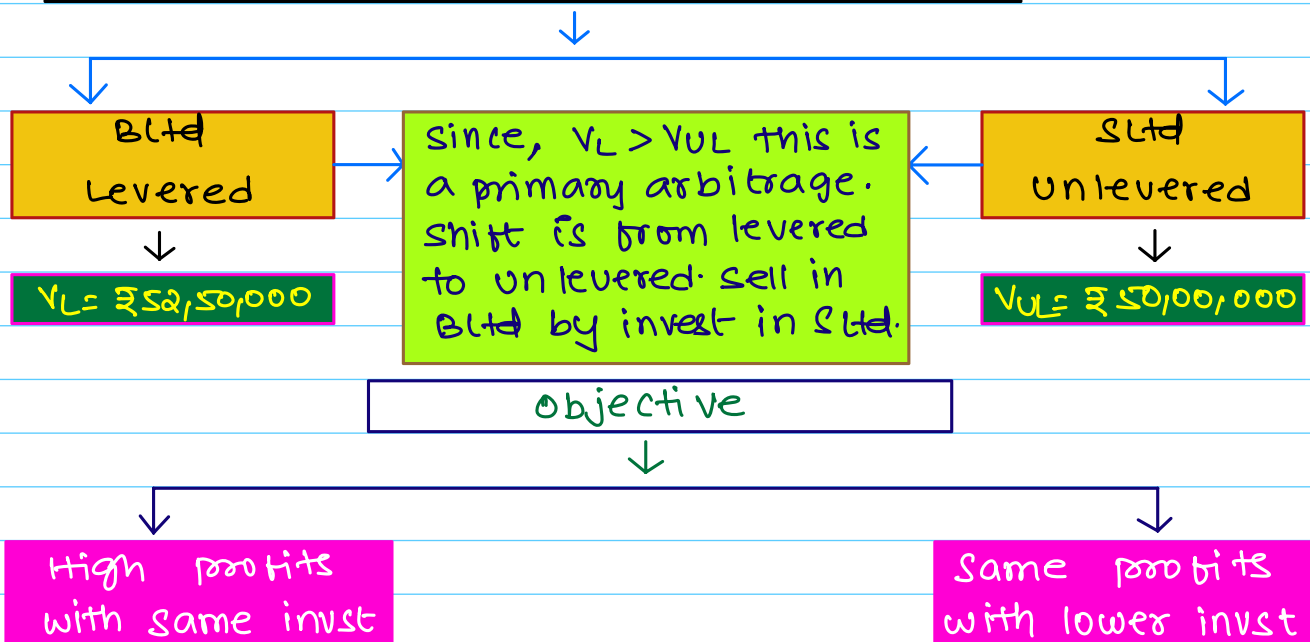
Example -1

Particulars	S Ltd	B Ltd
Type of company	Un levered	Levered
Debt value	—	₹30,00,000
EBIT	₹,50,000	₹,50,000
Interest @ 10%	—	3,00,000
EATSH	₹,50,000	4,50,000
k_e	15%	20%
V_E	50,00,000	22,50,000
V_D / B	—	30,00,000
Total value	50,00,000	52,50,000
k_o	15%	14.28%

Addl information

An investor holds 10% equity shares of company B Ltd. Show the arbitrage process.

Steps: Identification of arbitrage



obj1: Increased profits with same investment

Step 1: Steps to be taken today.

1. Sell shares in BLtd for ₹2,25,000
(₹22,50,000 × 10%)

(Value of shares in levered Co × % holding)

2. Borrow personally ₹3,00,000 @ 10%

(Amt to be borrowed = Debt of Levered Co × % holding)

3. Invest amount in hand in SLtd = ₹5,25,000

(Amt to be invested = Cash in hand + borrowings)

Step 2: Cash flows in future

1. Earnings in SLtd

Share of dividend : ₹50,00,000 → ₹7,50,000
 ₹5,25,000 → ?
 ₹78,750

(-) Interest cost : ₹3,00,000 × 10% = (₹30,000)
 Net earnings : ₹48,750

2. Comparison

	BLtd	SLtd	Gain
Earnings	₹45,000	₹48,750 + ₹3750	
Investment (own)	₹2,25,000	₹2,25,000	

with same investment we achieved more return.

Notes:

1. Why should we borrow?

The borrowing only gives us the additional earnings. we can borrow @ 10% and invest in S Ltd @ 15% ($\text{₹} 7,50,000 / \text{₹} 50,00,000$) and make an arbitrage gain of 5%.

2. Why should we borrow only ₹ 3,00,000 and not more?

* When we are holding equity shares of ₹ 2,25,000 in B Ltd, it is an investment with financial risk because for every ₹ 225 equity, there exist ₹ 300 debt.

* When this money is taken out of B Ltd and invested in S Ltd, the financial risk vanishes because S Ltd is unlevered.

* Hence, if we borrow ₹ 3,00,000 the risk level is restored to 225:300 (D:E ratio) which is same as the risk we had in B Ltd.

* If we borrow more than ₹ 3,00,000 the risk will increase. Our aim is to earn more return with same investment and same risk.

Obj 2:- same profit with lower investment.

Step 1: Steps to be taken today.

1. Sell shares in B Ltd for ₹ 2,25,000
($\text{₹} 22,50,000 \times 10\%$)

2. Borrow ₹ 3,00,000 @ 10%
(To maintain D:E ratio)

3. Invest in S Ltd.

Amount to be invested = % holding in previous Co
x
Shareholder value in
unlevered Co

$$= 10\% \times \text{₹} 50,00,000 = \text{₹} 5,00,000$$

Step 2: cash flows in future

1. Earnings in SLtd

Share of dividend

$$= ₹ 75,000$$

$$\left(\frac{₹ 7,50,000 \times ₹ 500,000}{₹ 50,00,000} \right)$$

2. Interest

on borrowings

$$= (₹ 30,000)$$

$$(₹ 3,00,000 \times 10\%)$$

3. Net earnings

$$= ₹ 45,000.$$

1 - 2

Step 3: Comparison

	BLtd	SLtd
Earnings	₹ 45,000	₹ 45,000
Investment	₹ 2,25,000	₹ 2,00,000

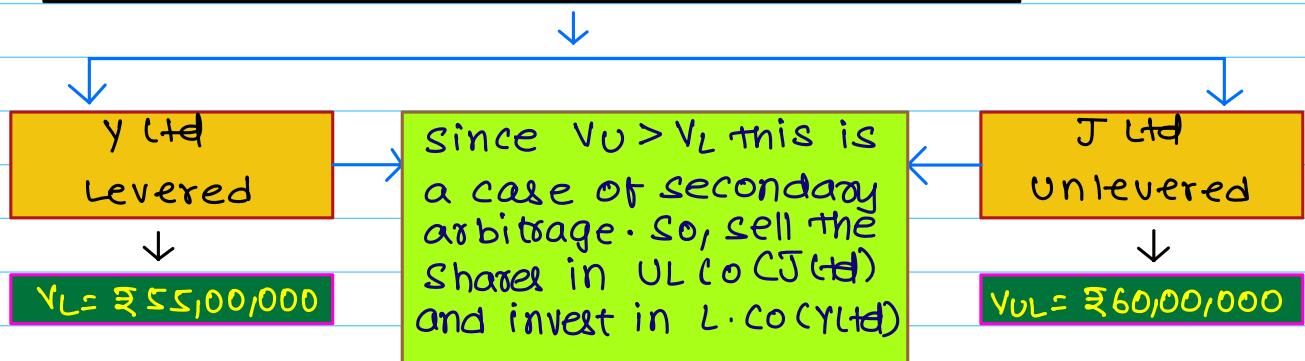
Example - 2

Particulars	J Ltd	Y Ltd
Type of company	Un levered	Levered
Debt value	—	₹ 5,00,000
EBIT	₹ 7,50,000	₹ 7,50,000
Interest @ 10%	—	₹ 50,000
EATSH	₹ 7,50,000	₹ 7,00,000
k_e	12.50%	14%
V_E	₹ 60,00,000	₹ 50,00,000
V_D / B	—	₹ 5,00,000
Total value	₹ 60,00,000	₹ 55,00,000
k_o	12.50%	13.63%
$D : E (B/S)$	0	10%

Addl information

An investor holds 10% equity shares of over valued firm. Determine his investment cost of earning the same income so that he is at a Breakeven. Calculate the arbitrage gain.

Steps: Identification of arbitrage



Obj-1 : Increased profit with same investment

Step 1: Steps to be taken today.

1. Sell shares in J Ltd for ₹6,00,000

$$(\text{₹}60,00,000 \times 10\%)$$

(Value of shares in Unlevered Co x % holding)

2. Invest amount in hand in both shares and debentures in Y Ltd in Debt equity ratio of Y Ltd.

CA Koushik Koushik

1. D:E = ₹5,00,000 : ₹50,00,000

$$= 1 : 10$$

2. Division of ₹6,00,000 in D/E ratio

$$1 : 10$$

Debentures

$$\begin{aligned} &\text{₹}6,00,000 \times 1/11 \\ &= \text{₹}54,545 \\ &(\text{@ } 10\%) \end{aligned}$$

Equity

$$\begin{aligned} &\text{₹}6,00,000 \times 10/11 \\ &= \text{₹}5,45,455 \end{aligned}$$

Step 2: Cash flows in future

1. Earnings in Y Ltd

$$\begin{aligned} \text{Share of dividend : } &\text{₹}50,00,000 \longrightarrow \text{₹}7,00,000 \\ &\text{₹}5,45,455 \longrightarrow ? \end{aligned}$$

$$\text{₹}76,365$$

$$(\text{+}) \text{ Interest income : } \text{₹}54,545 \times 10\% = \text{₹}5,455$$

$$\text{Total earnings : } \text{₹}81,820$$

Step 3: Comparison

Earnings

Investment

J Ltd

$$\text{₹}75,000$$

$$\text{₹}6,00,000$$

Y Ltd

$$\text{₹}81,820$$

$$+ \text{₹}6,820$$

Obj-2: Same profit with lower investment

Step 1: Steps to be taken today.

1. Sell shares in J Ltd for ₹6,00,000
(₹60,00,000 × 10%)

(Value of shares in levered Co × % holding)

2. Invest amount which gives us 10% stake in Y Ltd's equity and debt

calculation

Division of requisite amount to D+E

Debentures

Equity

Investment = ₹5,00,000 × 10%

Investment = ₹50,00,000 × 10%

= ₹50,000 (@ 10%) →

₹5,50,000

← = ₹5,00,000.

Step 2: Cash flows in future

1. Earnings in Y Ltd

Share of dividend : ₹50,00,000 → ₹7,00,000
₹5,00,000 → ?

₹70,000

(+) Interest income : ₹50,000 × 10% = ₹5,000

Total earnings : ₹75,000

Step 3: Comparison

Earnings

J Ltd

₹75,000

Y Ltd

₹75,000

Investment

₹6,00,000

₹5,50,000

Notes:

Q1: Why should we move from J Ltd to Y Ltd?

$$\text{ROE of J Ltd} = \frac{₹75,000}{₹60,00,000} \times 100 = 12.50\%$$

$$\text{ROE of Y Ltd} = \frac{₹7,00,000}{₹50,00,000} \times 100 = 14.00\%$$

* By becoming SH in Y Ltd for the same investment an extra 1.50% can be earned.

* If we purchase debentures in Y Ltd, we will get a return of only 10% which is lower than J Ltd's

return. Then why should we invest in debt?

Sol: When the SH holds ₹6,00,000 in J Ltd, it is an investment free of financial risk since J Ltd is unlevered.

When he invests in shares of Y Ltd, automatically a debt risk emerges with equity investment.

To neutralise this, we should have some invest in debt. That is why we invest in debt.

Capital structure theories – with taxation

* Till now, in all the models discussed we don't consider tax.

* But now we are going to analyse impact of tax on the theories. Tax will impact the theories in the following ways:

- In case of Net income approach, involvement of tax will further strengthen its proposition. It is undisputed because debt is already cheaper and more debt means lesser overall cost (k_0). Tax will further reduce k_d because interest is subject to tax. k_e does not change because tax does not hit the dividend. This can be explained as under:

Particulars	Co - J	Co - M (Amt ₹)
EBIT	3,00,000	3,00,000
Debt	9,00,000	—
k_d	10%	—
k_e	?	15%
k_0	?	15% (All equity $k_e = k_0$)

Tax

→ 50% ←

Sol: In case of NI approach, k_0 will change with the change in k_d (after-tax)

Particulars	J Ltd	"Z"	M Ltd
EBIT	3,00,000		3,00,000
(→) Interest (9,00,000 × 10%)	(90,000)		—
EBT	2,10,000		3,00,000
(→) Tax	(1,05,000)		(1,50,000)
EAT/EAESH	1,05,000		1,50,000
k_e	15%		15%
V_E (or) S	7,00,000		10,00,000
B (or) Debt	9,00,000		—
$V = B + S$	16,00,000		10,00,000
$k_o = \frac{EBIT(1-t)}{V}$	9.375%		15%

$$\therefore V = \frac{EBIT(1-t)}{k_o}$$

- In case of NOI approach, the tax is going to change the entire proposition because, as per that model, without tax, it is said that whether company is financed with debt/equity/ both the overall value of company remain unchanged because, k_d will reduce the k_o , and higher the debt component, higher the risk to the equity and eventually higher will be the k_e . The downward pull of k_d is equally offset by upward pull of k_e keeping k_o unchanged.
- But, if tax is involved, k_d becomes more cheaper due to tax savings on interest and then, downward pull is 2 times for 1 upward pull and therefore, k_o will not be same.
- The k_o of levered firm will be surely less than the k_o of unlevered firm and due to that $V_L > V_{UL}$.

The illustration already considered above will be used to explain NOI also.

Particulars	J Ltd	"I"	M Ltd
EBIT	3,00,000		3,00,000
(→) Interest (9,00,000 × 10%)	(90,000)		-
EBT	2,10,000		3,00,000
(→) Tax	(1,05,000)		(1,50,000)
EAT/EAESH	1,05,000		1,50,000
k_0	10.34%		15%
V	14,50,000		10,00,000
k_e	19.09%		15%

working notes

1. $V_L = V_U + (B \times t)$

$V_J = V_M + (B \times t)$

$= ₹10,00,000 + (₹9,00,000 \times 50\%)$

$= ₹10,00,000 + ₹4,50,000$

$= ₹14,50,000.$

2. Calc of J Ltd's Equity value

$V = B + S$; $S = V - B$, $S = ₹14,50,000 - ₹9,00,000$
 $= ₹5,50,000$

3. Calc of k_e

$k_e = \frac{EAESH}{S} = \frac{₹1,05,000}{₹5,50,000} = 19.09\%$

4. Calc of k_0 of J Ltd

$V = \frac{EBIT(1-t)}{k_0}$

$₹14,50,000 = \frac{₹1,50,000}{k_0}$; $k_0 = 10.34\%$

The formula as given above can be understood as under _____

* without tax $V_L = V_U$ as per NOI. But due to taxation J Ltd pays ₹45,000 lower tax for same EBIT like M Ltd. This extra benefit is due to interest tax shield which is perpetual.

* The PV of PCF = $\frac{CFP_a}{RR} \Rightarrow \frac{\text{Tax savings p.a}}{k_d}$
 $= \frac{₹90,000 \times (1-0.50)}{10\%}$

$$= \frac{\text{₹} 45,000}{10\%} = \text{₹} 4,50,000.$$

This number can be re-written as under —

$$\frac{\text{₹} 90,000 (0.5)}{10\%} \Rightarrow \left[\frac{\text{₹} 90,000}{10\%} \right] \times 50\%$$

$$= \left[\frac{I}{K_d} \right] \times t$$

$$\downarrow$$

$$B \times t$$

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(I6)

Step 1: Calculation of Value of N & m Ltd

Particulars	N Ltd	m Ltd
Type of Co	<u>UL</u>	<u>L</u>
EBIT	₹20,000	₹20,000
(-) Interest	—	(₹7,000)
EBT/EAESH	₹20,000	₹13,000
k_e	10%	11.50%
$S = \text{EAESH} / k_e$	₹2,00,000	₹1,13,043
	$\left[\frac{20,000}{10\%} \right]$	$\left[\frac{13,000}{11.50\%} \right]$
B = Given	—	₹1,00,000
$V = B + S$	₹2,00,000	₹2,13,043.

Step 2: Arbitrage process

- Since $V_L > V_{UL}$, this is a case of primary arbitrage.
- Let us assume that we are holding 10% shares of Levered Co i.e. m Ltd. Since it is a primary arbitrage, we shift from levered Co to unlevered Co.
- Hence, the overall arbitrage strategy is as under —

- * Sell shares in mLtd
- * Borrow an amount equal to Debt of mLtd to the proportion of SH.
- * Buy shares in NLtd
- * Book the arbitrage gain.

OBJ-1: HIGHER RETURN - SAME RISK ₹

1. Sell shares in mLtd = 11,304
(₹1,13,043 × 10%)
2. Borrow amount (Debt of mLtd × % SH) = 10,000
(₹1,00,000 × 10%)
3. Total amount = 21,304
4. Invest ₹21,304 in NLtd shares to receive dividend
5. Return from NLtd

Holding

Return

$$\begin{array}{rcl} ₹2,00,000 & ₹20,000 & \\ ₹21,304 & ? & = 2,130 \end{array}$$

6. Borrowing cost = (700)
(₹10,000 × 7%)

$$7. \text{ Net return} = 1,430$$

Comparison

	mLtd (₹)	NLtd	
Investment	11,304	11,304	
Return	1,300	1,430	↑ ₹130.

OBJ-2: SAME RETURN - LOWER RISK

1. Sell shares in m Ltd = 11,304
(₹1,13,043 × 10%)
2. Borrow amount (Debt of m Ltd × % SH) = 10,000
(₹1,00,000 × 10%)
3. Total amount = 21,304
4. Invest ₹20,000 in N Ltd
shares to receive dividend
5. Return from N Ltd

Holding

Return

$$\begin{array}{l} \text{₹2,00,000} \\ \text{₹20,000} \end{array} \quad \begin{array}{l} \text{₹20,000} \\ ? \end{array} = 2,000$$

6. Borrowing cost = (700)
(₹10,000 × 7%)

7. Net return = 1,300.

Comparison

	m Ltd	N Ltd	
Investment	11,304	10,000	↓ 1,304
Return	1,300	1,300	

(I7.)

Pg NO
5-20Step 1: Calculation of value of L & VL Co

Particulars	Unlevered (₹)	Levered
EBIT	30,000	30,000
(-) Interest	-	(10,000)
EBT/EAESH	30,000	20,000
k_e	12.50%	12.50%
$S = \text{EAESH} / k_e$	2,40,000	1,60,000
B (given)	-	1,00,000
$V = B + S$	2,40,000	2,60,000

Step 2: Arbitrage Strategy

1. Since, the $V_L > V_{UL}$, this is a case of primary arbitrage.
2. Hence, the investor has to sell his shares in L.Co and borrow an amount equal to his proportion of SH in L.Co and invest total amount in UL.Co.
3. Book Arbitrage gain.

Step 3: Application of Arbitrage Strategy

1. Sell shares in L.Co = 24,000
- (₹ 1,60,000 × 15%)
2. Borrow amount = 15,000
- (₹ 1,00,000 × 15%)
3. Total cash in Hand = 39,000
4. Invest ₹ 39,000 in the shares of UL.Co.
5. Return from UL Co = 4,875
- | | |
|----------------|---------------|
| <u>Holding</u> | <u>Return</u> |
| ₹ 2,40,000 | ₹ 30,000 |
| ₹ 39,000 | ? |
6. Interest on borrowings = (1,500)
- (₹ 15,000 × 10%)
7. Net return = 3,375

comparison

	L Co ₹	UL Co
Investment	24,000	24,000
Return	3,000	3,375 ↑ ₹375.

(I8.)

Step 1: Valuation of both companies

Particulars	ULtd (₹)	L Ltd
EBIT	20,000	20,000
(→ Interest (1,00,000 × 7%))	—	(7,000)
EATSH	20,000	13,000
k_e	10%	18%
$S = EATSH / k_e$	2,00,000	72,222
B (given)	—	1,00,000
$V = B + S$	2,00,000	1,72,222

CA Koushik Mukhesh

Step 2: Arbitrage Strategy

1. Since, the value of UL Co is more than L Co, this is a case of "Secondary arbitrage".
2. Let us assume that we are holding 10% shares of UL Co, we are selling the shares in UL Co and investing in L Co.
3. While investing, we should invest in both debt and equity of L Co in the Debt equity ratio of that company.
4. Book arbitrage gain.

Step 3: Application of arbitrage strategy

OBJ 1: HIGHER RETURN - SAME RISK

1. Sell shares in UL Co ₹ 20,000
(₹2,00,000 × 10%)
2. Invest ₹20,000 in L Co
debt and equity in the
D:E proportion.

$$\begin{array}{ll} \downarrow \text{Eq} & \text{Debt} \downarrow \\ \text{₹ } 20,000 \times \frac{72,222}{1,72,222} & \text{₹ } 20,000 \times \frac{1,00,000}{1,72,222} \\ = \text{₹ } 8,387 & \text{₹ } 11,613 \end{array}$$

3. Return on investment 2,323

Debt

 $\text{₹ } 11,613 \times 7\%$
 $= \text{₹ } 813$

Equity

 $\text{₹ } 8,387 \times 18\%$
 $= \text{₹ } 1,510$

Comparison

	UL Co	₹	L Co
Investment	20,000		20,000
Return	2,000		2,323 ↑ ₹323

OBJ-2: SAME RETURN - LOWER RISK

1. Sell shares in ULCO

₹
20,000

2. Invest in the debt and equity of LCO as a proportion of SH on both debt and equity.

17,222



Debt

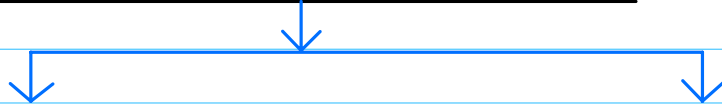
$$\begin{aligned} &= ₹ 1,00,000 \times 10\% \\ &= ₹ 10,000 \end{aligned}$$

Equity.

$$\begin{aligned} &= ₹ 72,222 \times 10\% \\ &= ₹ 7,222 \end{aligned}$$

3. Return on investment

2,000



Debt

$$\begin{aligned} &₹ 10,000 \times 7\% \\ &= ₹ 700 \end{aligned}$$

Equity.

$$\begin{aligned} &₹ 7,222 \times 18\% \\ &= ₹ 1,300 \end{aligned}$$

comparison

ULCO

LCO

Investment

₹ 20,000

₹ 17,222

↓ 2,778

Return

₹ 2,000

₹ 2,000.

(Iq.)
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5.23

Step 1: Calc of value of both companies

Particulars	UL Co ₹	L Co
EBIT	30,000	30,000
(-) Interest	—	(10,000)
EATSH	30,000	20,000
k_e	12.50%	20%
$S = EATSH/k_e$	2,40,000	1,00,000
B (given)	—	1,00,000
$V = B + S$	2,40,000	2,00,000

Step 2: Arbitrage Strategy

1. Since, the Value of UL is more than the L Co, this is the case of secondary arbitrage.
2. In case of secondary arbitrage, the investor has to divert his amount from the UL Co to L Co.
3. Therefore the strategy is ———
 - * Sell the shares in UL Co
 - * Invest the total amount in L Co on both debt & equity in the Debt-Equity ratio of L Co.

Step 3: Application of Arbitrage strategy ₹

1. sell the shares in UL Co 36,000
(₹ 2,40,000 × 15%)
2. invest ₹ 36,000 in debt and equity of L Co.

↓ Debt	Equity ↓
₹ 36,000 × 1/2	₹ 36,000 × 1/2
= ₹ 18,000	= ₹ 18,000

3. Return on investment

₹,400

↓ Debt	↓ Equity
$₹18,000 \times 10\%$	$₹18,000 \times 20\%$
$= ₹1,800$	$= ₹3,600$

Comparison

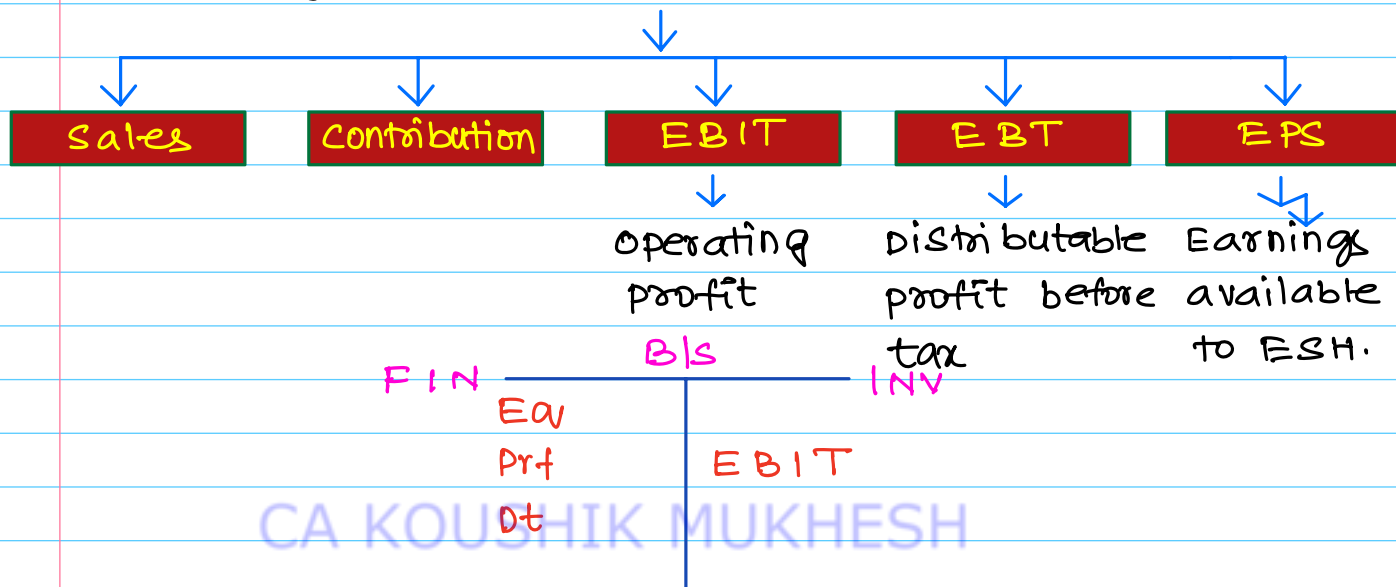
	VL Co (₹)	L Co
Investment	36,000	36,000
Return	4,500 (36,000 × 12.50%)	₹,400 ↑ 900

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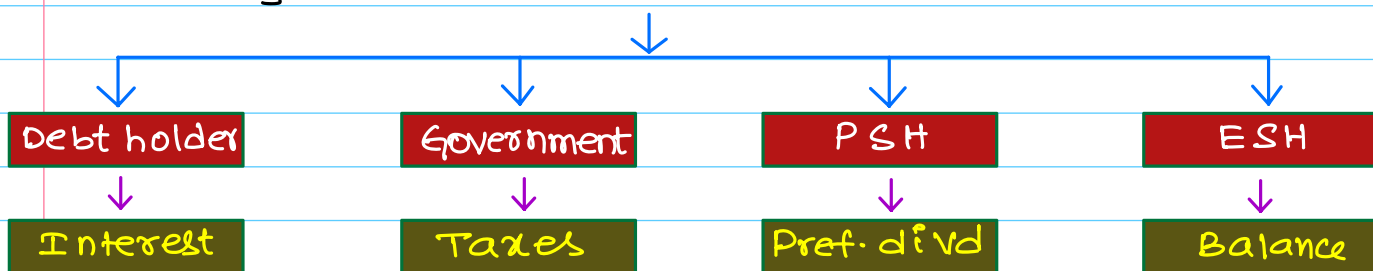
EBIT - EPS ANALYSIS

Introduction

- * A company has to make 2 important decisions w.r.t wealth maximisation, they are ———
 - Financing decision (Equity/Debt/combination)
 - Investment decision (Assets - generating CF)
- * Cash flows generated can be of various types namely ———



- * The EBIT generated will belong to 4 persons namely

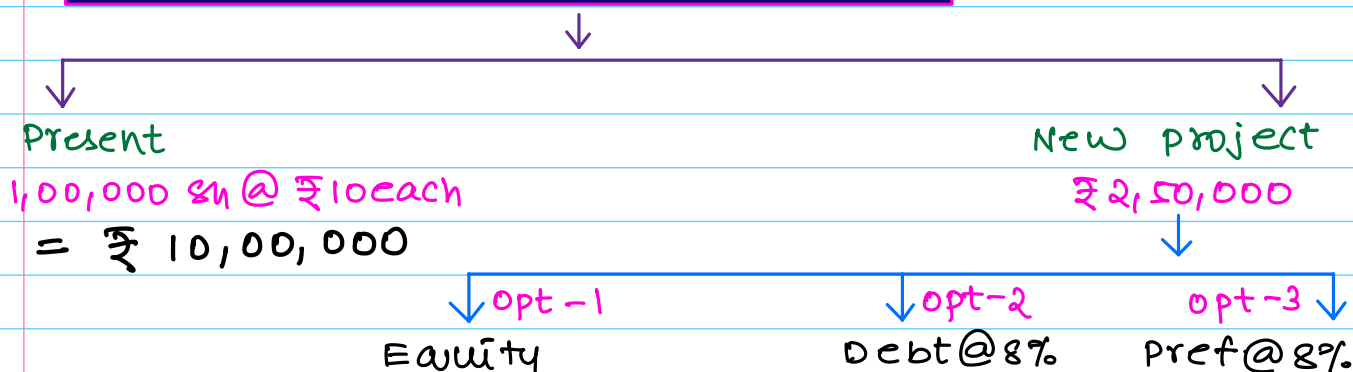


- * Companies can raise funds from any source but business will be done for the favour of ESH.
- * But, optimum capital structure will be such a capital structure which gives higher EPS for a given level of EBIT.
- * If EBIT of a project is very high, it is better to finance the project by debt because same interest shall be paid for increased EBIT.
- * On the other hand, if EBIT is very low, it is best

to have an all-equity financing because, interest cost may lead to loss.

11.

Step 1: Understanding the situation.



Step 2: Calculation of EPS.

Amounts (₹)			
Particulars	Equity	Debt	Preference
EBIT	3,12,500	3,12,500	3,12,500
(-) Interest	—	(20,000)	—
EBT	3,12,500	2,92,500	3,12,500
(-) Tax @ 50%	(1,56,250)	(1,46,250)	(1,56,250)
EAT	1,56,250	1,46,250	1,56,250
(-) Pref. div.	—	—	(20,000)
EAESH	1,56,250	1,46,250	1,36,250
÷ NOS	1,25,000	1,00,000	1,00,000
EPS	1.25	1.46	1.36

Step 3: Calculation of EPS if EBIT is ₹75,000.

Amounts (₹)			
Particulars	Equity	Debt	Preference
EBIT	75,000	75,000	75,000
(-) Interest	—	(20,000)	—
EBT	75,000	55,000	75,000
(-) Tax @ 50%	(37,500)	(27,500)	(37,500)
EAT	37,500	27,500	37,500
(-) Pref. div.	—	—	(20,000)
EAESH	37,500	27,500	17,500
÷ NOS	1,25,000	1,00,000	1,00,000
EPS	0.30	0.275	0.175

concept of Indifference point

- * Indifference point is a EBIT where EPS under any two plans will be same.
- * At the IDP, whether it is all equity financed/ debt financed (or) any combination, EPS will be same.

Note: Students should note that, if a question is given on financing a project with various plans and in which EBIT is not given, it is a question on EBIT - EPS indifference concept.

concept of financial break-even point

Financial breakeven is a situation where the EPS is exactly '₹0' at a certain level of EBIT. This changes from one plan to another. It is represented by following formula _____

$$\frac{FBE P}{I + \frac{PD}{1-t}}$$

I = Interest in ₹ terms

PD = Preference dividend in ₹ terms

t = tax rate.

12.

Step 1: Calculation of no. of new shares to be issued

Particulars	Option 1 Amt (₹)	Option 3
Amount to be raised	₹ 50,00,000	₹ 25,00,000
Issue price	₹ 25	₹ 50
No. of. Shares	2,00,000.	50,000.

Step 2: Calculation of total no. of. Shares

Particulars	Option 1 Amt (₹)	Option 3
Existing Shares	10,00,000	10,00,000
(+) New issue	2,00,000	50,000
Revised Shares	12,00,000	10,50,000

Step 3: Calculation of interest on debentures

Particulars	Option 2 Amt (₹)	Option 3
Principal	50,00,000	25,00,000
Interest @ 16%	8,00,000	4,00,000

Step 4: Calculation of EPS Under all 3 options.

amounts (₹)			
Particulars	option - 1 100% equity	option - 2 100% Debt	option - 3 50: 50
Existing EBIT	60,00,000	60,00,000	60,00,000
(+) Addl EBIT	40,00,000	40,00,000	40,00,000
Total EBIT	1,00,00,000	1,00,00,000	1,00,00,000
(-) Interest	—	(8,00,000)	(4,00,000)
EBT	1,00,00,000	92,00,000	96,00,000
(-) Tax @ 50%	(50,00,000)	(46,00,000)	(48,00,000)
EAT	50,00,000	46,00,000	48,00,000
NOS	12,00,000	10,00,000	10,50,000
EPS	4.167	4.60	4.57

Comment :- Option 2 is recommended since it is giving a higher EPS.

13. Step 1:- Analysing all the 3 alternatives of funding

Amounts (₹)			
Particulars	option - 1	option - 2	option - 3
Required fund	25,00,000	25,00,000	25,00,000
Debt amount	2,50,000	10,00,000	15,00,000
Equity amount	22,50,000	15,00,000	10,00,000

Step 2: mps expected and interest rate in 3 cases

Particulars	option-1	option - 2	option - 3
Debt amount	2,50,000	10,00,000	15,00,000
Interest rate	10%	10%+15%	10%+15%+20%
Expected mps	₹150	₹150	₹125

Step 3: NO. of. shares to be issued.

Particulars	option-1	option - 2	option - 3
Equity amt	22,50,000	15,00,000	10,00,000
mps	150	150	125
New issue	15,000	10,000	8,000

Step 4: Calculation of interest cost

Particulars	option-1	option-2	option-3
Debt amt	2,50,000	10,00,000	15,00,000
Rates appl	10%	2,50,000 - 10% 7,50,000 - 15%	2,50,000 - 10% 7,50,000 - 15% 5,00,000 - 20%
Interest	25,000	1,37,500	2,37,500

Step 5: Calculation of EPS

Particulars	option-1	option-2	option-3
EBIT	5,00,000	5,00,000	5,00,000
(-) Interest	(25,000)	(1,37,500)	(2,37,500)
EBT	4,75,000	3,62,500	2,62,500
(-) Tax @ 50%	(2,37,500)	(1,81,250)	(1,31,250)
EAT	2,37,500	1,81,250	1,31,250
NOS	15,000	10,000	8,000
Eps	15.83	18.13	16.41

Practical Problems

(PPI)
Pg No
5.52.

- Since face value/sh is not given, it is assumed as ₹10.
- Though question doesn't emphasize on another option, Indifference point will be calculated taking 1st option as "All equity".
- Since, option -1 is all equity, interest cost will be '0'.

Step 1: Calculation of interest cost under option - 2

Amount required = ₹9 cr.
Debt component (2/3) = ₹9 cr × 2/3 = ₹6 cr
Interest @ 12% = ₹6 cr × 12% = ₹72,00,000.

Step 2: Indifference point

<u>Particulars</u>	<u>option 1</u>	<u>option 2</u>
EBIT	x	x
(-) Interest	-	(₹ 72,00,000)
EBT	x	$x - 72,00,000$
(-) Tax @ 30%	(0.30x)	(0.30x - 21,60,000)
EAT	0.70x	0.70x - 50,40,000
NOS	90,00,000	30,00,000
Eps. (WN)		

WN: Eps & EBIT calculation

option - 1:

$$Eps = \frac{0.70x}{90L}$$

option - 2:

$$Eps = \frac{0.70x - 50.40L}{30L}$$

Equating 1 & 2 gives common EBIT

$$\frac{0.70x}{90} = \frac{0.70x - 50.40}{30}$$

$$\Rightarrow 21x = 63x - 4536$$

$$\Rightarrow 42x = 4536$$

$$\begin{aligned}\Rightarrow x &= 108 \text{ Lakhs} \\ &= 1,08,00,000.\end{aligned}$$

(PP2)
Pg No
S. 52

- a. It is given that, indifference is achieved at ₹ 4,80,000, it is considered as EBIT.
b. Rate of preference dividend shall be calculated as %.

Particulars	Plan A	Plan B
Type	Eq + Debt	Eq + pref.
EBIT (given)	₹ 4,80,000	₹ 4,80,000
(-) Interest (4,00,000 × 12%)	(₹ 48,000)	—
EBT	₹ 4,32,000	₹ 4,80,000
(-) Tax @ 30%	(₹ 1,29,600)	(₹ 1,44,000)
EAT	₹ 3,02,400	₹ 3,36,000
(-) Pref. div.	—	x
EAESH	₹ 3,02,400	₹ 3,36,000 - x
NOS	80,000	80,000
Eps	₹ 3.78	$\frac{₹ 3,36,000 - x}{80,000}$

Note: IDP is the level of EBIT at which Eps under any 2 plans will be same.

$$\therefore ₹ 3.78 = \frac{₹ 3,36,000 - x}{₹ 80,000}$$

$$\Rightarrow ₹ 3,02,400 = ₹ 3,36,000 - x$$

$$\Rightarrow x = ₹ 33,600.$$

$$x = \text{Pref. div} = ₹ 33,600.$$

$$\text{Rate of pref. div} = \frac{\text{PD}}{\text{PCap}} \times 100$$

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

$$= 8.40\%.$$

(PP 3)
PQ NO
5.52

Calculation of Indifferent EBIT

Particulars	Plan A (₹)	Plan B
EBIT	x	x
↳ Interest (60,00,000 × 2/3 × 18%)	—	(₹ ₹120,000)
EBT	x	$x - ₹120,000$
↳ Tax @ 40%	(0.40x)	(0.40x - 2,88,000)
EAT	0.60x	0.60x - 4,32,000
NOS	6,00,000	2,00,000
		$\left[\frac{(60,00,000 - 40,00,000)}{10} \right]$
Eps	$\frac{0.60x}{6,00,000}$	$\frac{0.60x - 4,32,000}{2,00,000}$

At IDP, Eps under both the plans shall be same.

$$\therefore \frac{0.60x}{6} = \frac{0.60x - 4.32}{2} \quad (\text{All amts in Lakhs})$$

$$\Rightarrow 1.20x = 3.60x - 25.92$$

$$\Rightarrow 2.40x = 25.92$$

$$\Rightarrow x = ₹ 10.80 \text{ L (or)} \\ ₹ 10,80,000.$$

(PP 4.)

Pg No
5.52Step 1: Calculation of Eps

Particulars	Plan A	Plan B	Plan C
Type of plan	only Eq	Eq + Debt	Eq + pref.
EBIT	80,000	80,000	80,000
(-) Interest (2,00,000 × 50% × 8%)	—	(8,000)	—
EBT	80,000	72,000	80,000
(-) Tax @ 50%	(40,000)	(36,000)	(40,000)
EAT	40,000	36,000	40,000
(-) Pref. div. (2,00,000 × 50% × 8%)	—	—	(8,000)
EAESH	40,000	36,000	32,000
NOS	10,000	5,000	5,000
	$\left[\frac{2,00,000}{20} \right]$	$\left[\frac{1,00,000}{20} \right]$	$\left[\frac{1,00,000}{20} \right]$
Eps.	₹ 4	₹ 7.20	₹ 6.40

Step 2: Calculation of financial BEPa. Plan - A:

Since, debt and pref. capital is not there in the capital structure, financial BEP is a place where EBIT is '0'.

b. Plan - B:

In case of plan-B, FBEP = Interest
Since, pref. capital is not there.
∴ FBEP (EBIT) = Interest = ₹ 8,000.

c. Plan - C:

$$FBEP = I + \frac{PD}{1-t}$$

$$= 0 + \frac{₹ 8,000}{1-0.50} = \frac{₹ 8,000}{0.50} = ₹ 16,000$$

Step 3: Calculation of EBIT-EPS IDP

combination 1 : Plan A & B (₹)

Particulars	A	B
EBIT	x	x
(-) Interest	—	(₹ 8,000)
EBT	x	$x - 8,000$
(-) Tax @ 50%	$(0.50x)$	$0.50x - 4,000$
EAT	$0.50x$	$0.50x - 4,000$
NOS	10,000	5,000
Eps	$\frac{0.50x}{10,000}$	$\frac{0.50x - 4,000}{5,000}$

$$\Rightarrow \frac{0.50x}{10,000} = \frac{0.50x - 4,000}{5,000}$$

$$\Rightarrow 2,500x = 5,000x - 4,000,000$$

$$\Rightarrow 2,500x = 4,000,000$$

$$\Rightarrow x = ₹ 16,000.$$

combination 2: Plan B & Plan C

Particulars	B	C (₹)
EBIT	x	x
(-) Interest	(8,000)	—
EBT	$x - 8,000$	x
(-) Tax @ 50%	$0.50x - 4,000$	$(0.50x)$
EAT	$0.50x - 4,000$	$0.50x$
(-) pref. div	—	(8,000)
EATSH	$0.50x - 4,000$	$0.50x - 8,000$
NOS	5,000	5,000
Eps	$\frac{0.50x - 4,000}{5,000}$	$\frac{0.50x - 8,000}{5,000}$

$$\Rightarrow 0.50x - 4,000 \neq 0.50x - 8,000$$

Plans are incomparable.

Combination 3: Plan A & C

Particulars	A	C
EBIT	₹	₹
(-) Interest	—	—
EBT	₹	₹
(-) Tax @ 50%	(0.50₹)	(0.50₹)
EAT	0.50₹	0.50₹
(-) Pref div	—	(8,000)
EATSH	0.50₹	0.50₹ - 8,000
NOS	10,000	5,000

IDP:

$$\frac{0.50₹}{10,000} = \frac{0.50₹ - 8,000}{5,000}$$

CA Koushik Mukhesh

$$\begin{aligned} 2,500₹ &= 5000₹ - 8,000,000 \\ ₹ &= ₹ 32,000. \end{aligned}$$

PP5.

Step 1: Calculation of Eps under 3 alternatives (₹)

Pg NO

5-53

Particulars	option-1	option-2	option-3
Type of plan	only debt	only pref.	only Eq.
EBIT	15,00,000	15,00,000	15,00,000
(-) Interest			
opt-1:			
Existing : 3,60,000			
New : 4,80,000	(8,40,000)	(3,60,000)	(3,60,000)
EBT	6,60,000	11,40,000	11,40,000
(-) Tax @ 40%	(2,64,000)	(4,56,000)	(4,56,000)
EAT	3,96,000	6,84,000	6,84,000
(-) Pref. div.	—	(4,40,000)	—
EATSH	3,96,000	2,44,000	6,84,000
NOS	8,00,000	8,00,000	10,50,000
Eps	0.495	0.305	0.651

⊗ total no. of shares

$$\begin{array}{rcl} \text{Existing shares} & = & 8,00,000 \\ \text{New Issue} & = & 2,50,000 \\ \hline \text{₹ } 40,00,000 & & \\ \text{₹ } 16 & & \end{array}$$

$$\text{Total} = 10,50,000$$

Step 2: Indifference point

out of 3 options, 1st best is all equity being option 3 and next best is all debt being option 1. Hence, we will calculate EBIT at IDP and take a decision accordingly.

Particulars option 1 (₹) option 3

EBIT	x	x
(-) Interest	(8,40,000)	(3,60,000)
EBT	x - 8,40,000	x - 3,60,000
(-) Tax @ 40%	(0.40x - 3,36,000)	(0.40x - 1,44,000)
EAT	0.60x - 5,04,000	0.60x - 2,16,000
NOS	8,00,000	10,50,000

IDP:

$$\frac{0.60x - 5,04,000}{8,00,000} = \frac{0.60x - 2,16,000}{10,50,000}$$

$$\downarrow$$

$$\frac{0.60x - 504}{800} = \frac{0.60x - 216}{1050} \quad (\text{In } 000\text{'s})$$

$$\Rightarrow 630x - 5,29,200 = 480x - 1,72,800$$

$$\Rightarrow 150x = 3,56,400$$

$$\Rightarrow x = 2,376$$



$$\text{EBIT} = ₹ 23,76,000.$$

(PP6)
Pg NO
5.54

Steps Calculation of EPS & EBIT

Particulars	option 1	option 2
EBIT	x	x
(-) Interest (20,00,000 × 12%) (40,00,000 × 12%)	(2,40,000)	(4,80,000)
EBT	$x - 2,40,000$	$x - 4,80,000$
(-) Tax @ 30%	(0.30x - 72,000)	(0.30x - 1,44,000)
EAT	0.70x - 1,68,000	0.70x - 3,36,000
NOS	60,000	40,000

IDP: (₹ in 000's)

$$\frac{0.70x - 168}{60} = \frac{0.70x - 336}{40}$$

$$\Rightarrow 28x - 6,720 = 42x - 20,160$$

$$\Rightarrow 14x = ₹13,440$$

$$\Rightarrow x = ₹9,60,000$$

The best alternative could be that alternative which gives EBIT > ₹9,60,000.

(PP7)
Pg. 5.54

As per MM model, companies which are identical in all aspects except for their capital structures, should have same value of Co. To have same value for both the Cos, k_0 should be same. This can be presented as under—

	Sanghmani ^o	Samsui ^o
Type	Debt + Eq	Eq.
k_d	10%	—
k_e	?	16%
k_0	16%	16%
	↑ ($k_e = k_0$)	

$$\begin{aligned}
 k_o &= W_d k_d + W_e k_e \\
 16 &= (1/3 \times 10) + (2/3 \times k_e) \\
 16 &= 3.33 + 0.667 k_e \\
 12.67 &= 0.667 k_e \\
 k_e &= 19\%
 \end{aligned}$$

(PP8)
Pg. No
5.54

Given information

Particulars	A Ltd	B Ltd
EBIT	₹18,00,000	₹18,00,000
Debt	₹54,00,000	—
k_e	—	18%

A)
without
taxes.

*As per mm model, companies having same EBIT should have same value.

*Therefore, value of A Ltd and B Ltd is same.

*Since, B Ltd is having only equity k_e will be the k_o and hence value is calculated which in turn applied also to A Ltd.

Step 1: Calculation of value of B Ltd

$$V = \frac{\text{EBIT}}{k_o}$$

$$V = \frac{\text{₹18,00,000}}{18\%} \quad (\because k_e = k_o)$$

$$V = \text{₹1,00,00,000}$$

(Same is the value of A Ltd)

Step 2: Calculation of missing information

Particulars	A Ltd (₹)	B Ltd
EBIT	18,00,000	18,00,000
k_o	18%	18%
V	1,00,00,000	1,00,00,000
B	54,00,000	—
$S(V - B)$	46,00,000	1,00,00,000
k_d (given)	12%	—
k_e ⊗	25.04%	18%

$$\begin{aligned}
 \textcircled{*} \quad k_0 &= W_d k_d + W_e k_e \\
 18 &= (0.54 \times 12) + (0.46 \times k_e) \\
 18 &= 6.48 + 0.46 k_e \\
 0.46 k_e &= 11.52 \\
 k_e &= 25.04\%
 \end{aligned}$$

B) with Taxes.

Step 1: Calculation of k_d (post-tax)

$$\begin{aligned}
 k_d \text{ (pre-tax)} &= 12\% \\
 (-) \text{ Tax @ } 40\% &= (4.8\%) \\
 k_d \text{ (post-tax)} &= 7.2\%
 \end{aligned}$$

Step 2: Calculation of Value of Btd
Particulars (Unlevered) Amt (₹)

EBIT	18,00,000
(-) Interest	—
EBT	18,00,000
(-) Tax @ 40%	(₹, 20,000)
EAT/EATSH	10,80,000

$$\begin{aligned}
 \text{Value of Btd} &= \frac{10,80,000}{18\%} \quad (k_e = k_0) \\
 \left[\frac{\text{EBIT}(1-t)}{k_0} \right] &= ₹ 60,00,000.
 \end{aligned}$$

Step 3: Calculation of Value of Alt

$$\begin{aligned}
 V_A &= V_B + (B \times t) \\
 &= ₹ 60,00,000 + (₹ 54,00,000 \times 40\%) \\
 &= ₹ 60,00,000 + ₹ 21,60,000 \\
 &= ₹ 81,60,000.
 \end{aligned}$$

Step 4: Calculation of k_0

$$\begin{aligned}
 V_A &= \frac{\text{EBIT}(1-t)}{k_0} \\
 ₹ 81,60,000 &= \frac{₹ 18,00,000 \times 0.60}{k_0}
 \end{aligned}$$

$$\text{₹ } 81,60,000 = \frac{\text{₹ } 10,80,000}{k_0}$$

$$k_0 = 13.24\%$$

Step 5: Calculation of k_e (Alt)

$$k_e = \frac{E A E S H}{S}$$

a. Particulars	Amt (₹)
EBIT	18,00,000
(-) Interest	(6,48,000)
EBT	11,52,000
(-) Tax @ 40%	(4,60,800)
EAT / E A E S H	6,91,200

b. Value of Equity (S)

$$V_A = V_B + V_S$$

$$\text{₹ } 81,60,000 = \text{₹ } 54,00,000 + V_S$$

$$V_S = \text{₹ } 27,60,000.$$

c. Calc of k_e

$$k_e = \frac{\text{₹ } 6,91,200}{\text{₹ } 27,60,000}$$

$$k_e = 25.04\%$$

(PP9)
Pg No.
5-54

As per MM model, companies belonging to same risk class with same EBIT shall have same value and hence k_0 is same.

Step 1: Calculation of k_0

$$V = \frac{EBIT}{k_0} ; k_0 = \frac{EBIT}{V}$$

$$= k_0 = \frac{\text{₹ } 21.60 \text{ L}}{\text{₹ } 120 \text{ L}}$$

$$= k_0 = 18\%$$

Step 2: Calculation of k_e

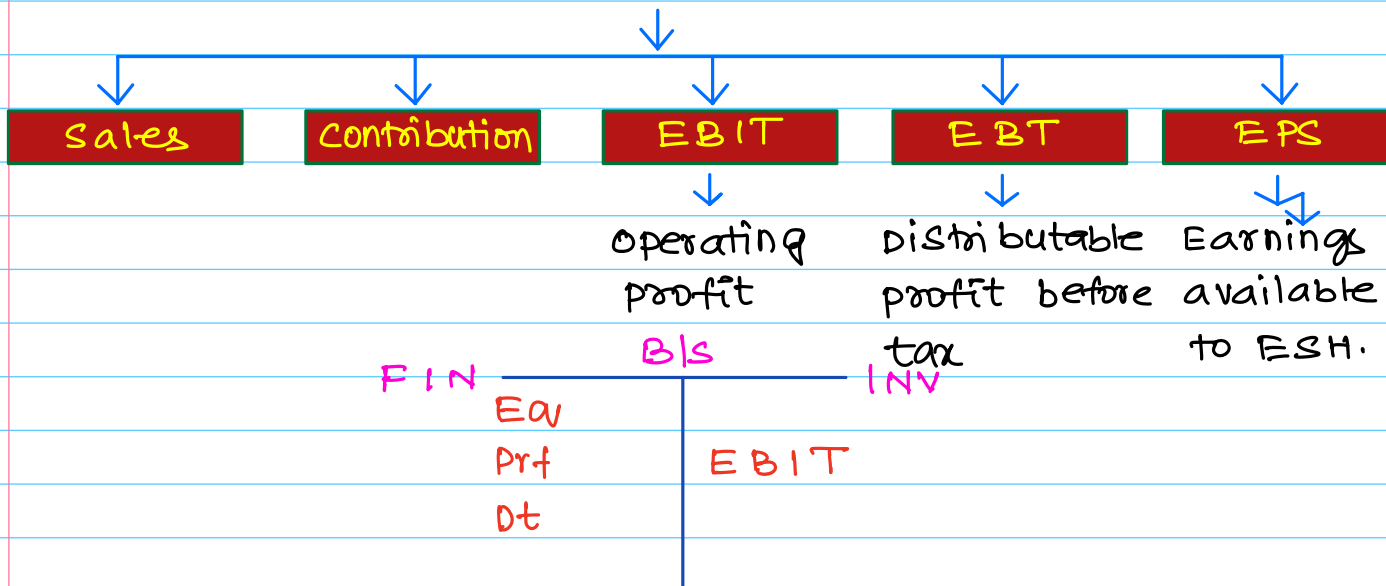
₹ in Lakhs.

Case	Debt	Equity	W_d	W_e	K_D	K_D	k_e
1	—	120	—	1	18	—	18% [18% - (0% -)]
2.	10	110	0.083	0.9166	18	7	19%.
3.	20	100	0.167	0.833	18	7	20.20%.
4.	30	90	0.25	0.750	18	7.50	21.50%.
5.	40	80	0.33	0.670	18	7.50	23.25%.
6.	50	70	0.416	0.584	18	8.00	25.14%.
7.	60	60	0.50	0.500	18	8.50	27.50%.
8.	70	50	0.583	0.417	18	9.00	30.60%.
9.	80	40	0.667	0.333	18	10.00	34.00%.

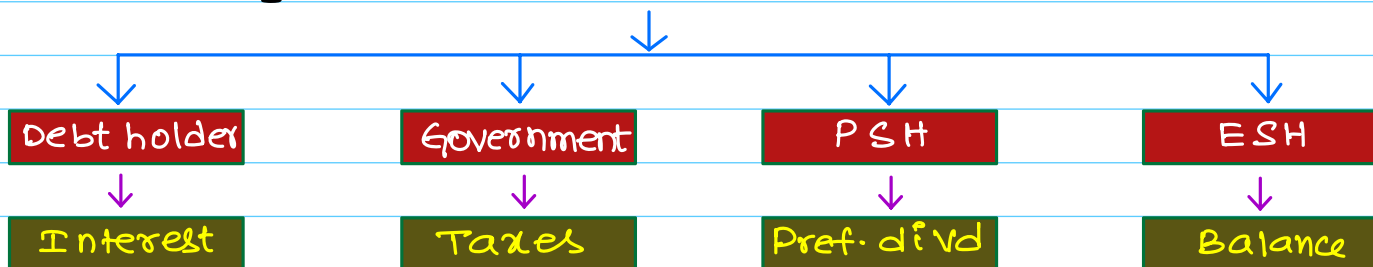
EBIT - EPS ANALYSIS

Introduction

- * A company has to make 2 important decisions w.r.t wealth maximisation, they are ———
 - Financing decision (Equity/Debt/combination)
 - Investment decision (Assets - generating CF)
- * Cash flows generated can be of various types namely ———



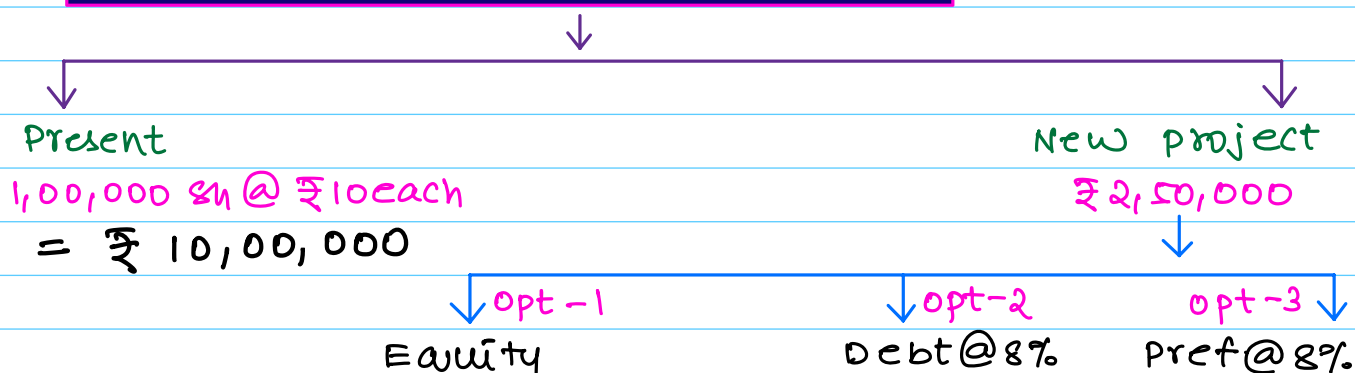
- * The EBIT generated will belong to 4 persons namely



- * Companies can raise funds from any source but business will be done for the favour of ESH.
- * But, optimum capital structure will be such a capital structure which gives higher EPS for a given level of EBIT.
- * If EBIT of a project is very high, it is better to finance the project by debt because same interest shall be paid for increased EBIT.
- * On the other hand, if EBIT is very low, it is best

to have an all-equity financing because, interest cost may lead to loss.

11. Step 1: Understanding the situation.



Step 2: Calculation of EPS.

Amounts (₹)			
Particulars	Equity	Debt	Preference
EBIT	3,12,500	3,12,500	3,12,500
(-) Interest	—	(20,000)	—
EBT	3,12,500	2,92,500	3,12,500
(-) Tax @ 50%	(1,56,250)	(1,46,250)	(1,56,250)
EAT	1,56,250	1,46,250	1,56,250
(-) Pref. div.	—	—	(20,000)
EAESH	1,56,250	1,46,250	1,36,250
÷ NOS	1,25,000	1,00,000	1,00,000
EPS	1.25	1.46	1.36

Step 3: Calculation of EPS if EBIT is ₹75,000.

Amounts (₹)			
Particulars	Equity	Debt	Preference
EBIT	75,000	75,000	75,000
(-) Interest	—	(20,000)	—
EBT	75,000	55,000	75,000
(-) Tax @ 50%	(37,500)	(27,500)	(37,500)
EAT	37,500	27,500	37,500
(-) Pref. div.	—	—	(20,000)
EAESH	37,500	27,500	17,500
÷ NOS	1,25,000	1,00,000	1,00,000
EPS	0.30	0.275	0.175

concept of Indifference point

- * Indifference point is a EBIT where EPS under any two plans will be same.
 - * At the IDP, whether it is all equity financed/ debt financed (or) any combination, EPS will be same.
- Note: Students should note that, if a question is given on financing a project with various plans and in which EBIT is not given, it is a question on EBIT - EPS indifference concept.

concept of financial break-even point

Financial breakeven is a situation where the EPS is exactly '₹0' at a certain level of EBIT. This changes from one plan to another. It is represented by following formula _____

$$\frac{FBE P}{I + \frac{PD}{1-t}}$$

I = Interest in ₹ terms
PD = Preference dividend in ₹ terms
t = tax rate.

12.

Step 1: Calculation of no. of new shares to be issued

Particulars	Option 1 Amt (₹)	Option 3
Amount to be raised	₹ 50,00,000	₹ 25,00,000
Issue price	₹ 25	₹ 50
No. of. shares	2,00,000.	50,000.

Step 2: Calculation of total no. of. shares

Particulars	Option 1 Amt (₹)	Option 3
Existing shares	10,00,000	10,00,000
(+) New issue	2,00,000	50,000
Revised shares	12,00,000	10,50,000

Step 3: Calculation of interest on debentures

Particulars	Option 2 Amt (₹)	Option 3
Principal	50,00,000	25,00,000
Interest @ 16%	8,00,000	4,00,000

Step 4: Calculation of EPS Under all 3 option

Particulars	Amounts (₹)		
	Option - 1 100% equity	Option - 2 100% Debt	Option - 3 50:50
Existing EBIT	60,00,000	60,00,000	60,00,000
(+) Addl EBIT	40,00,000	40,00,000	40,00,000
Total EBIT	1,00,00,000	1,00,00,000	1,00,00,000
(-) Interest	—	(8,00,000)	(4,00,000)
EBT	1,00,00,000	92,00,000	96,00,000
(-) Tax @ 50%	(50,00,000)	(46,00,000)	(48,00,000)
EAT	50,00,000	46,00,000	48,00,000
NOS	12,00,000	10,00,000	10,50,000
EPS	4.167	4.60	4.57
Comment :- Option 2 is recommended since it is giving a higher EPS.			

13. Step 1:- Analysing all the 3 alternatives of funding

Particulars	Amounts (₹)		
	Option - 1	Option - 2	Option - 3
Required fund	25,00,000	25,00,000	25,00,000
Debt amount	2,50,000	10,00,000	15,00,000
Equity amount	22,50,000	15,00,000	10,00,000

Step 2: mps expected and interest rate in 3 cases

Particulars	Option - 1	Option - 2	Option - 3
Debt amount	2,50,000	10,00,000	15,00,000
Interest rate	10%	10% + 15%	10% + 15% + 20%
Expected mps	₹150	₹150	₹125

Step 3: NO. of. shares to be issued.

Particulars	Option - 1	Option - 2	Option - 3
Equity amt	22,50,000	15,00,000	10,00,000
mps	150	150	125
New issue	15,000	10,000	8,000

Step 4: calculation of interest cost

Amt (₹)			
Particulars	option-1	option-2	option-3
Debt amount	2,50,000	10,00,000	15,00,000
Interest cost	25,000 (2,50,000 × 10%)	1,37,500 (2,50,000 × 10%) + (7,50,000 × 15%)	2,37,500 (2,50,000 × 10%) + (7,50,000 × 15%) + (5,00,000 × 20%)

Step 5: calculation of EPS

Amt (₹)			
Particulars	option-1	option-2	option-3
EBIT	5,00,000	5,00,000	5,00,000
(-) Interest	(25,000)	(1,37,500)	(2,37,500)
EBT	4,75,000	3,62,500	2,62,500
(-) Tax @ 50%	(2,37,500)	(1,81,250)	(1,31,250)
EAT	2,37,500	1,81,250	1,31,250
÷ NOS	15,000	10,000	8,000
EPS	₹15.833	₹18.125	₹16.406

Plan II is recommended since EPS is more.

5

Financing Decision – Capital structure

Question 1

(RTP Nov 23)

1. Prakash Limited provides you the following information:

	(₹)
Profit (EBIT)	3,00,000
Less: Interest on Debenture @ 10%	(50,000)
EBT	2,50,000
Less: Income Tax @ 50%	(1,25,000)
	1,25,000
No. of Equity Shares (₹ 10 each)	25,000
Earnings per share (EPS)	5
Price /EPS (PE) Ratio	10

The company has reserves and surplus of ₹ 7,50,000 and required ₹ 5,00,000 further for modernisation. Return on Capital Employed (ROCE) is constant. Debt (Debt/ Debt + Equity) Ratio higher than 40% will bring the P/E Ratio down to 8 and increase the interest rate on additional debts to 12%. You are required to ASCERTAIN the probable price of the share.

(i) If the additional capital is raised as debt; and

(ii) If the amount is raised by issuing equity shares at ruling market price

Answer:

Particulars	Plan - I	Plan - II
	If ₹ 5,00,000 is raised as debt (₹)	If ₹ 5,00,000 is raised by issuing equity shares (₹)
Earnings Before Interest and Tax (EBIT)		
{20% of new capital i.e., 20% of (₹15,00,000 + ₹ 5,00,000)} (Refer working note1)	4,00,000	4,00,000

Less: Interest on old debentures (10% of ₹5,00,000)	(50,000)	(50,000)
Less: Interest on new debt (12% of ₹5,00,000) Earnings Before Tax (EBT)	2,90,000	3,50,000
Less: Tax @ 50%	(1,45,000)	(1,75,000)
Earnings for equity shareholders (EAT)	1,45,000	1,75,000
No. of Equity Shares (refer working note 2)	25,000	35,000
Earnings per Share (EPS)	₹ 5.80	₹ 5.00
Price/ Earnings (P/E) Ratio (refer working note 3)	8	10
Probable Price Per Share (PE Ratio × EPS)	₹ 46.40	₹ 50

Working Notes:**1. Calculation of existing Return of Capital Employed (ROCE):**

	(₹)
Equity Share capital (25,000 shares × ₹10)	2,50,000
10% Debentures $\left(50,000 \times \frac{100}{10} \right)$	5,00,000
Reserves and Surplus	7,50,000
Total Capital Employed	15,00,000
Earnings before interest and tax (EBIT) (given)	3,00,000
ROCE = $\frac{3,00,000}{15,00,000} \times 100$	20%

2. Number of Equity Shares to be issued in Plan-II:

$$= \frac{5,00,000}{50} = 10,000 \text{ Shares}$$

Thus, after the issue total number of shares = 25,000 + 10,000 = 35,000 shares

3. Debt/Equity Ratio if ₹ 5,00,000 is raised as debt:

$$= \frac{10,00,000}{20,00,000} \times 100 = 50\%$$

As the debt equity ratio is more than 40% the P/E ratio will be brought down to 8 in Plan-I

Question 2**(RTP May 23)**

Current Capital Structure of XYZ Ltd is as follows:

Equity Share Capital of 7 lakh shares of face value	₹ 20 each
Reserves of	₹ 10,00,000
9% bonds of	₹ 3,00,00,000
11% preference capital: 3,00,000 shares of face value	₹ 50 each
Additional Funds required for XYZ Ltd are	₹ 5,00,00,000.

XYZ Ltd is evaluating the following alternatives:

- I. Proposed alternative I: Raise the funds via 25% equity capital and 75% debt at 10%. PE ratio in such scenario would be 12.
- II. Proposed alternative II: Raise the funds via 50% equity capital and rest from 12% Preference capital .PE ratio in such scenario would be 11.

Any new equity capital would be issued at a face value of ₹ 20 each. Any new preferential capital would be issued at a face value of ₹ 20 each. Tax rate is 34%

DETERMINE the indifference point under both the alternatives.

Answer:

Current Capital Structure

Equity Share Capital	20 × 7 Lakhs	1,40,00,000
Reserves		10,00,000
9% Bonds		3,00,00,000
11% Preference Share Capital	50 × 3 Lakhs	1,50,00,000
Total Capital Employed		6,00,00,000

Proposed Capital Structure

Capital	Working	Proposal I	Proposal II
---------	---------	------------	-------------

Capital to be raised		₹ 5,00,00,000	₹ 5,00,00,000
Equity	5,00,00,000 25%	× ₹ 1,25,00,000	---
	5,00,00,000 50%	× ---	₹ 2,50,00,000
Debt @ 10%	5,00,00,000 75%	× ₹ 3,75,00,000	---
Preference Shares @ 12%	5,00,00,000 50%	× ---	₹ 2,50,00,000

Combined Capital		Amount Proposal I	Amount Proposal II
Equity		2,65,00,000	3,90,00,000
Reserves		10,00,000	10,00,000
9% Bond		3,00,00,000	3,00,00,000
10% Debt		3,75,00,000	---
11% Preference Shares		1,50,00,000	1,50,00,000
12% Preference Shares			2,50,00,000
		11,00,00,000	11,00,00,000

Interest for Proposal I = ₹ 3,00,00,000 × 9% + ₹ 3,75,00,000 × 10%

= ₹ 27,00,000 + ₹ 37,50,000

= ₹ 64,50,000

Preference Dividend for Proposal I = ₹ 1,50,00,000 × 11% = ₹ 16,50,000

Interest for Proposal II = ₹ 3,00,00,000 × 9% = ₹ 27,00,000

Preference Dividend for Proposal II = ₹ 1,50,00,000 × 11% + ₹ 2,50,00,000 × 12%

= ₹ 16,50,000 + ₹ 30,00,000 = ₹ 46,50,000

Let the indifference point be ₹ X

For Proposal I,

$$\text{EPS} = \frac{(X - 64,50,000) \times 0.66 - 16,50,000}{13,25,000} \quad \text{----- (1)}$$

For Proposal II,

$$\text{EPS} = \frac{(X - 27,00,000) \times 0.66 - 46,50,000}{13,25,000} \quad \text{----- (2)}$$

Equating (1) and (2),

$$\text{EPS} = \frac{(X - 64,50,000) \times 0.66 - 16,50,000}{13,25,000} = \frac{(X - 27,00,000) \times 0.66 - 46,50,000}{13,25,000}$$

$$\frac{0.66X - 59,07,000}{53} = \frac{0.66X - 64,32,000}{78}$$

$$₹ 51.48X - ₹ 46,07,46,000 = ₹ 37.98X - ₹ 34,08,96,000$$

$$₹ 16.5X = ₹ 11,98,50,000$$

$$\text{Indifference Point} = X = ₹ 72,63,636.36$$

Question 3

(RTP Nov 22)

ABC Limited provides you the following information:

	(₹)
Profit (EBIT)	2,80,000
Less: Interest on Debt @10%	40,000
EBT	2,40,000
Less: Income Tax @ 50%	1,20,000
	1,20,000
No. of Equity Shares (₹ 10 each)	30,000
Earnings per share (EPS)	4
Price / EPS (P/E) Ratio	10
Ruling Market price per share	40

The company has undistributed reserves of ₹ 7,00,000 and needs ₹ 4,00,000 further for expansion. This investment is expected to earn the same rate as funds already invested. You are informed that a debt equity (debt/ debt + equity) ratio higher than 32% will push the P/E ratio down to 8 and raise the interest rate on additional borrowings (debentures) to 12%. You are required to ASCERTAIN the probable price of the share.

- If the additional funds are raised as debt; and
- If the amount is raised by issuing equity shares at ruling market price of ₹ 40 per share.

Answer:

Particulars	Plan - I	Plan - II
	If ₹ 4,00,000 is raised as debt (₹)	If ₹ 4,00,000 is raised by issuing equity shares (₹)
Earnings Before Interest and Tax (EBIT)	3,60,000	3,60,000
{20% on (₹14,00,000 + ₹ 4,00,000)}		
Less: Interest on old debentures (10% of ₹4,00,000)	40,000	40,000
	3,20,000	3,20,000
Less: Interest on New Debt 12% on ₹4,00,000	48,000	---
Earnings Before Tax (after Interest)	2,72,000	3,20,000
Less: Tax @ 50%	1,36,000	1,60,000
Earnings for equity shareholders (EAIT)	1,36,000	1,60,000
No. of Equity Shares (in numbers)	30,000	40,000
Earnings per Share (EPS)	₹4.53	₹ 4.00
Price / Earnings Ratio	8	10
Probable Price Per Share	₹ 36.24	₹ 40
	(8 × 4.53)	(10 × 4)

Working Notes:

	(₹)
1. Calculation of Present Rate of Earnings	
Equity Share capital (30,000 × ₹ 10)	3,00,000
10% Debentures $\left(40,000 \times \frac{100}{10}\right)$	4,00,000
Reserves (given)	7,00,000
	14,00,000
Earnings before interest and tax (EBIT) given	2,80,000
Rate of Present Earnings = $\left(\frac{2,80,000}{14,00,000} \times 100\right)$	20%
2. Number of Equity Shares to be issued in Plan $\left(\frac{4,00,000}{40}\right)$	10,000

	Thus, after the issue total number of shares	$30,000 + 10,000 = 40,000$
3.	Debt/Equity Ratio if ₹ 4,00,000 is raised as debt:	$\left(\frac{8,00,000}{18,00,000} \times 100 \right)$

As the debt equity ratio is more than 32% the P/E ratio shall be 8 in plan (i) = 44.44%

Question 4

(RTP Nov 20)

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.

Answer:

Computation of Rate of Preference Dividend

$$\frac{(\text{EBIT} - \text{Interest})(1 - t)}{\text{No. of Equity Shares}(N1)} = \frac{\text{EBIT}(1 - t) - \text{Preference Dividend}}{\text{No. of Equity Shares}(N2)}$$

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

$$₹ 3,02,400 = 3,36,000 - \text{Preference Dividend}$$

$$\text{Preference Dividend} = ₹ 3,36,000 - ₹ 3,02,400 = ₹ 33,600$$

$$\text{Rate of Dividend} = \frac{\text{Preference Dividend}}{\text{Preference Share Capital}} \times 100 = \frac{33,600}{4,00,000} \times 100 = 8.4\%$$

Question 5

(RTP May 20)

CALCULATE the level of earnings before interest and tax (EBIT) at which the EPS indifference point between the following financing alternatives will occur.

1. Equity share capital of ₹60,00,000 and 12% debentures of ₹40,00,000.

(Or)

2. Equity share capital of ₹40,00,000, 14% preference share capital of ₹20,00,000 and 12% debentures of ₹40,00,000.

Assume the corporate tax rate is 35% and par value of equity share is ₹100 in each case.

Answer:

Computation of level of earnings before interest and tax (EBIT)

In case, alternative (i) is accepted, then the EPS of the firm would be:

$$\begin{aligned} \text{EPS Alternative (i)} &= \frac{(\text{EBIT} - \text{Interest})(1 - \text{TaxRate})}{\text{No. of Equity Shares}} \\ &= \frac{(\text{EBIT} - 0.12 \times 40,00,000)(1 - 0.35)}{60,000 \text{ Shares}} \end{aligned}$$

In case, alternative (ii) is accepted, then the EPS of the firm would be:

$$\text{EPS Alternative (ii)} = \frac{(\text{EBIT} - 0.12 \times 40,00,000)(1 - 0.35) - (0.14 \times 20,00,000)}{40,000 \text{ Shares}}$$

In order to determine the indifference level of EBIT, the EPS under the two alternative plans should be equated as follows:

$$\frac{(\text{EBIT} - 0.12 \times 40,00,000)(1 - 0.35)}{60,000 \text{ Shares}} = \frac{(\text{EBIT} - 0.12 \times 40,00,000)(1 - 0.35) - (0.14 \times 20,00,000)}{40,000 \text{ Shares}}$$

$$\text{Or } \frac{0.65 \text{ EBIT} - 3,12,000}{3} = \frac{0.65 \text{ EBIT} - 5,92,000}{2}$$

$$\text{Or } 1.30 \text{ EBIT} - ₹6,24,000 = 1.95 \text{ EBIT} - ₹17,76,000$$

$$\text{Or } (1.95 - 1.30) \text{ EBIT} = ₹17,76,000 - ₹6,24,000 = ₹11,52,000$$

$$\text{Or } \text{EBIT} = \frac{11,52,000}{0.65}$$

Or EBIT = ₹17,72,308

Question 6

(RTP Nov 19)

The management of RT Ltd. wants to raise its funds from market to meet out the financial demands of its long- term projects. The company has various combinations of proposals to raise its funds. You are given the following proposals of the company:

Proposal	Equity shares (%)	Debts (%)	Preference Shares (%)
P	100	---	---
Q	50	50	---
R	20	---	50

Cost of debt and preference shares is 12% each.

Tax rate -40%

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

Total investment to be raised ₹8,00,00,000.

Expected earnings before interest and tax ₹3,60,00,000.

From the above proposals the management wants to take advice from you for appropriate plan after computing the following:

- Earnings per share
- Financial break-even-point

COMPUTE the EBIT range among the plans for indifference.

Answer:

Computation of Earnings per Share (EPS)

Plans	P (₹)	Q (₹)	R (₹)
Earnings before interest & tax (EBIT)	3,60,00,000	3,60,00,000	3,60,00,000
Less: Interest charges	---	(48,00,000)	---

Earnings before tax (EBT)	3,60,00,000	3,12,00,000	3,60,00,000
Less: Tax @ 40%	(1,44,00,000)	(1,24,80,000)	(1,44,00,000)
Earnings after tax (EAT)	2,16,00,000	1,87,20,000	2,16,00,000
Less: Preference share dividend	---	---	(48,00,000)
Earnings available for equity shareholders	2,16,00,000	1,87,20,000	1,68,00,000
No. of equity shares	40,00,000	20,00,000	20,00,000
E.P.S	5.40	9.36	8.40

1. Computation of Financial Break-even Points

Proposal 'P' = 0

Proposal 'Q' = ₹48,00,000 (Interest charges)

Proposal 'R' = Earnings required for payment of preference share dividend i.e.

$$= \frac{48,00,000}{0.6} = ₹80,00,000$$

2. Computation of Indifference Point between the Proposals

Combination of Proposals

(a) Indifference point where EBIT of proposal "P" and proposal 'Q' is equal

$$\frac{\text{EBIT}(1-0.4)}{40,00,000 \text{ Shares}} = \frac{(\text{EBIT} - 48,00,000)(1-0.4)}{20,00,000 \text{ Shares}}$$

$$0.6 \text{ EBIT} = 1.2 \text{ EBIT} - ₹57,60,000$$

$$\text{EBIT} = ₹96,00,000$$

(b) Indifference point where EBIT of proposal 'P' and proposal 'R' is equal:

$$\frac{\text{EBIT}(1-0.4)}{40,00,000 \text{ Shares}} = \frac{\text{EBIT}(1-0.4) - 48,00,000}{20,00,000 \text{ Shares}}$$

$$\frac{0.6 \text{ EBIT}}{40,00,000 \text{ Shares}} = \frac{0.6 \text{ EBIT} - 48,00,000}{20,00,000 \text{ Shares}}$$

$$0.30 \text{ EBIT} = 0.6 \text{ EBIT} - ₹48,00,000$$

$$\text{EBIT} = \frac{48,00,000}{0.30} = 1,60,00,000$$

(c) Indifference point where EBIT of proposal 'Q' and proposal 'R' are equal

$$\frac{(\text{EBIT} - 48,00,000)(1 - 0.4)}{20,00,000 \text{ Shares}} = \frac{\text{EBIT}(1 - 0.4) - 48,00,000}{20,00,000 \text{ Shares}}$$

There is no indifference point between proposal 'Q' and proposal 'R'

Question 7

(RTP May 19)

Akash Limited provides you the following information:

	(₹)
Profit (EBIT)	2,80,000
Less: Interest on Debenture @ 10%	(40,000)
EBT	2,40,000
Less: Income Tax @ 50%	(1,20,000)
	1,20,000
No. of Equity Shares (₹ 10 each)	30,000
Earnings per share (EPS)	4
Price /EPS (PE) Ratio	10

The company has reserves and surplus of ₹ 7,00,000 and required ₹ 4,00,000 further for modernization. Return on Capital Employed (ROCE) is constant. Debt (Debt/ Debt + Equity) Ratio higher than 40% will bring the P/E Ratio down to 8 and increase the interest rate on additional debts to 12%. You are required to ASCERTAIN the probable price of the share.

- If the additional capital is raised as debt; and
- If the amount is raised by issuing equity shares at ruling market price.

Answer:

Ascertainment of probable price of shares of Akash Limited

Particulars	Plan - I	Plan - II
	If ₹ 4,00,000 is raised as debt (₹)	If ₹ 4,00,000 is raised by issuing equity shares (₹)
Earnings Before Interest and Tax (EBIT) {20% of new capital i.e. 20% of (₹14,00,000 + ₹4,00,000)} (Refer working note1)	3,60,000	3,60,000
Less: Interest on old debentures (10% of ₹4,00,000)	(40,000)	(40,000)
Less: Interest on new debt (12% of ₹4,00,000)	(48,000)	---
Earnings Before Tax (EBT)	2,72,000	3,20,000
Less: Tax @ 50%	(1,36,000)	(1,60,000)
Earnings for equity shareholders (EAT)	1,36,000	1,60,000
No. of Equity Shares (refer working note 2)	30,000	40,000
Earnings per Share (EPS)	4.53	4.00
Price/ Earnings (P/E) Ratio (refer working note 3)	₹ 8	₹ 10
Probable Price Per Share (PE Ratio × EPS)	₹ 36.24	₹ 40

Working Notes:

1) Calculation of existing Return of Capital Employed (ROCE):

	(₹)
Equity Share capital (30,000 shares × ₹10)	3,00,000
10% Debentures $\left(10,000 \times \frac{100}{10}\right)$	4,00,000
Reserves and Surplus	7,00,000
Total Capital Employed	14,00,000
Earnings before interest and tax (EBIT) (given)	2,80,000
ROCE = $\frac{2,80,000}{14,00,000} \times 100$	20%

2) Number of Equity Shares to be issued in Plan-II:

$$= \frac{4,00,000}{40} \times 10,000 \text{ shares}$$

Thus, after the issue total number of shares = 30,000 + 10,000 = 40,000 shares

3) Debt/Equity Ratio if ₹ 4,00,000 is raised as debt:

$$= \frac{8,00,000}{18,00,000} \times 100 = 44.44\%$$

As the debt equity ratio is more than 40% the P/E ratio will be brought down to 8 in Plan-I

Question 8

(MTP Nov 23)

A Company earns a profit of ₹7,00,000 per annum after meeting its interest liability of ₹1,00,000 on 10% debentures. The Tax rate is 40%. The number of Equity Shares of ₹10 each are 1,00,000 and the retained earnings amount to ₹20,00,000. The company proposes to take up an expansion scheme for which a sum of ₹10,00,000 is required. It is anticipated that after expansion, the company will be able to achieve the same return on investment as at present. The funds required for expansion can be raised either through debt at the rate of 12% or by issuing equity shares at par.

Required:

- (i) **COMPUTE** the Earnings per Share (EPS), if:
 - The additional funds were raised as debt
 - The additional funds were raised by issue of equity shares.
- (ii) **ADVISE** the company as to which source of finance is preferable.

Answer:

Working Notes:

1) Capital employed before expansion plan:	(₹)
Equity shares (₹10 × 1,00,000 shares)	10,00,000

Debentures $\{(\text{₹}1,00,000/10) \times 100\}$	10,00,000
Retained earnings	20,00,000
Total capital employed	40,00,000

2) Earnings before the payment of interest and tax (EBIT): (₹)

Profit (EBT)	7,00,000
Add: Interest	1,00,000
EBIT	8,00,000

3) Return on Capital Employed (ROCE):

$$\text{ROCE} = \frac{\text{EBIT}}{\text{Capital Employed}} \times 100 = \frac{8,00,000}{40,00,000} \times 100 = 20\%$$

4) Earnings before interest and tax (EBIT) after expansion scheme:

After expansion, capital employed = ₹40,00,000 + ₹10,00,000 = ₹50,00,000

Desired EBIT = 20% × ₹50,00,000 = ₹10,00,000

Question 9

(MTP Nov. 23)

Computation of Earnings Per Share (EPS) under the following options:

	Present Situation	Expansion Scheme Additional Funds	
		Debt	Equity
		(₹)	(₹)
Earnings before Interest and Tax (EBIT)	8,00,000	10,00,000	10,00,000
Less: Interest - Old capital	1,00,000	1,00,000	1,00,000
- New capital	---	1,00,000 (10,00,000 × 10%)	---

Earnings before Tax (EBT)	7,00,000	8,00,000	9,00,000
Less: Tax (40% of EBT)	2,80,000	3,20,000	3,60,000
PAT	4,20,000	4,80,000	5,40,000
No. of shares outstanding	1,00,000	1,00,000	2,00,000
Earnings per Share (EPS)	4.20 $\left(\frac{4,20,000}{1,00,000} \right)$	4.80 $\left(\frac{4,80,000}{1,00,000} \right)$	2.70 $\left(\frac{5,40,000}{2,00,000} \right)$

1. Advise to the Company: When the expansion scheme is financed by additional debt, the EPS is higher. Hence, the company should finance the expansion scheme by raising debt

2. Bhaskar Manufactures Ltd. have Equity Share Capital of ₹ 5,00,000 (face value ₹100) to meet the expenditure of an expansion programme, the company wishes to raise ₹ 3,00,000 and is having following four alternative sources to raise the funds:

Plan A: To have full money from equity shares.

Plan B: To have ₹ 1 lakhs from equity and ₹ 2 lakhs from borrowing from the financial institution @ 10% p.a.

Plan C: Full money from borrowing @ 10% p.a.

Plan D: ₹1 lakh in equity and ₹ 2 lakhs from preference shares at 8% p.a.

The company is expected to have earnings of ₹ 1,50,000. The corporate tax is 50%. Suggest a suitable plan of the above four plans to raise the required funds.

Answer:

Statement showing the EPS under the four plans

	Plan A (₹)	Plan B (₹)	Plan C (₹)	Plan D (₹)
Equity share capital	8,00,000	6,00,000	5,00,000	6,00,000
8% Pref. Share capital	---	---	---	2,00,000
Borrowing @ 10%	---	2,00,000	3,00,000	---

	8,00,000	8,00,000	8,00,000	8,00,000
E.B.I.T	1,50,000	1,50,000	1,50,000	1,50,000
Less: Interest @ 10%		20,000	30,000	
E.B.T	1,50,000	1,30,000	1,20,000	1,50,000
Less: Tax	75,000	65,000	60,000	75,000
Less: Pref Dividend				16,000
Earnings available to equity shareholders	75,000	65,000	60,000	59,000
No. of equity shares (₹100)	8,000	6,000	5,000	6,000
Earnings per share	9.38	10.83	12.00	9.83

Question 10**(MTP1 May 23)**

Aeron We Ltd. is considering two alternative financing plans as follows:

Particulars	Plan A (₹)	Plan B (₹)
Equity shares of ₹ 100 each	90,00,000	90,00,000
Preference Shares of ₹ 100 each	---	20,00,000
9% Debentures	20,00,000	---
	1,10,00,000	1,10,00,000

The indifference point between the plans is ₹7,60,000. Corporate tax rate is 25%. CALCULATE the rate of dividend on preference shares.

Answer:**Computation of Rate of Preference Dividend**

$$\frac{(\text{EBIT} - \text{Interest})(1 - t)}{\text{No. of Equity Shares (N1)}} = \frac{\text{EBIT} - (1 - t) - \text{Preference Dividend}}{\text{No. of Equity Shares (N2)}}$$

$$\frac{(7,60,000 - 1,80,000) \times (1 - 0.25)}{90,000 \text{ Shares}} = \frac{7,60,000 - (1 - 0.25) \text{ Preference Dividend}}{90,000 \text{ Shares}}$$

$$\frac{4,35,000}{90,000 \text{ Shares}} = \frac{5,70,000 - \text{Preference Dividend}}{90,000 \text{ Shares}}$$

$$₹ 4,35,000 = ₹ 5,70,000 - \text{Preference Dividend}$$

$$\text{Preference Dividend} = ₹ 5,70,000 - ₹ 4,35,000 = ₹ 1,35,000$$

$$\text{Rate of Dividend} = \frac{\text{Preference Dividend}}{\text{Preference Share Capital}} \times 100$$

$$= \frac{1,35,000}{20,00,000} \times 100 = 6.75\%$$

Question 11**(MTP1 May 23)**

RML Limited needs ₹6,50,00,000 for the Expansion purposes. The following three plans are feasible:

- (I) The Company may issue 6,50,000 equity shares at ₹100 per share.
 - (II) The Company may issue 4,00,000 equity shares at ₹100 per share and 2,50,000 debentures of ₹100 denomination bearing a 9% rate of interest.
 - (III) The Company may issue 4,00,000 equity shares at ₹100 per share and 2,50,000 cumulative preference shares at ₹100 per share bearing a 9% rate of dividend.
- (i) If the Company's earnings before interest and taxes are ₹15,62,500, ₹22,50,000, ₹62,50,000, ₹93,75,000 and ₹1,56,25,000, CALCULATE the earnings per share under each of three financial plans? Assume a Corporate Income tax rate of 25%.
- (ii) WHICH alternative would you recommend and why?

Answer:**Computation of EPS under three-financial plans.****Plan I: Equity Financing**

	(₹)	(₹)	(₹)	(₹)	(₹)
EBIT	15,62,500	22,50,000	62,50,000	93,76,000	1,56,25,000
Interest	0	0	0	0	0
EBT	15,62,500	22,50,000	62,50,000	93,76,000	1,56,25,000

Less Tax @ 25%	3,90,625	5,62,500	15,62,500	23,43,750	39,06,250
PAT	11,71,875	16,87,500	46,87,500	70,31,250	1,17,18,750
No. of equity shares	6,50,000	6,50,000	6,50,000	6,50,000	6,50,000
EPS	1.80	2.60	7.21	10.82	18.03

Plan II: Debt - Equity Mix

	(₹)	(₹)	(₹)	(₹)	(₹)
EBIT	15,62,500	22,50,000	62,50,000	93,76,000	1,56,25,000
Less: Interest	22,50,000	22,50,000	22,50,000	22,50,000	22,50,000
EBT	(6,87,500)	0	40,00,000	71,25,000	1,33,75,000
Less Tax @ 25%	1,71,875*	0	10,00,000	17,81,250	33,43,750
PAT	(5,15,625)	0	30,00,000	53,43,750	1,00,31,250
No. of equity shares	4,00,000	4,00,000	4,00,000	4,00,000	4,00,000
EPS (₹)	(1.29)	0	7.50	13.36	25.08

* The Company can set off losses against the overall business profit or may carry forward it to next financial years.

Plan III: Preference Shares - Equity Mix

	(₹)	(₹)	(₹)	(₹)	(₹)
EBIT	15,62,500	22,50,000	62,50,000	93,75,000	1,56,25,000
Less: Interest	0	0	0	0	0
EBT	15,62,500	22,50,000	62,50,000	93,75,000	1,56,25,000
Less Tax @ 25%	3,90,625	5,62,500	15,62,500	23,43,750	39,06,250
PAT	11,71,875	16,87,500	46,87,500	70,31,250	1,17,18,750
Less: Pref. Dividend*	22,50,000	22,50,000	22,50,000	22,50,000	22,50,000
PAT after €pref. dividend	(10,78,125)	(5,62,500)	24,37,500	47,81,250	94,68,750

No. of equity shares	4,00,000	4,00,000	4,00,000	4,00,000	4,00,000
EPS (₹)	(2.70)	(1.41)	6.09	11.95	23.67

* In case of cumulative preference shares, the company has to pay cumulative dividend to preference shareholders.

(ii) In case of lower EBIT Plan I i.e Equity Financing is better however in case of higher EBIT Plan II i.e Debt=Equity Mix is best.

Question 12

(MTP2 Nov 22)

Axar Ltd. has a Sales of ₹ 68,00,000 with a Variable cost Ratio of 60%.

The company has fixed cost of ₹16,32,000. The capital of the company comprises of 12% long term debt,

₹1,00,000 Preference Shares of ₹ 10 each carrying dividend rate of 10% and 1,50,000 equity shares.

The tax rate applicable for the company is 30%.

At current sales level, DETERMINE the Interest, EPS and amount of debt for the firm if a 25% decline in Sales will wipe out all the EPS.

Answer:

Break Even Sales = ₹ 6800000 × 0.75 = ₹ 51,00,000

Income Statement

	Original (₹)	Calculation of Interest at BEP (backward calculation) (₹)	Now at Present Level (₹)
Sales	68,00,000	51,00,000	68,00,000
Less: Variable Cost	40,80,000	30,60,000	40,80,000
Contribution	27,20,000	20,40,000	27,20,000
Less: Fixed Cost	16,32,000	16,32,000	16,32,000
EBIT	10,88,000	4,08,000	10,88,000
Less: Interest (EBIT-PBT)	?	3,93,714	3,93,714

PBT	?	14,286(10,000/70%)	6,94,286
Less: Tax @ 30%(or PBT-PAT)	?	4,286	2,08,286
PAT	?	10,000(Nil + 10,000)	4,86,000
Less: Preference Dividend	10,000	10,000	10,000
Earnings for Equity share holders	?	Nil (at BEP)	4,76,000
Number of Equity Shares	1,50,000	1,50,000	1,50,000
EPS	?	---	3.1733

So, Interest=₹3,93,714, EPS=₹3.1733,

Amount of debt=3,93,714/12%=₹ 32,80,950

Question 13

(MTP2 May 22)

Following data is available in respect of two companies having same business risk: Capital employed = ₹ 4,00,000, EBIT = ₹ 60,000 and $K_e = 12.5\%$

Sources	Levered Company (₹)	Unlevered Company (₹)
Debt (@ 10%)	2,00,000	Nil
Equity	2,00,000	4,00,000

An investor is holding 15% shares in levered company. CALCULATE the increase in annual earnings of investor if he switches his holding from Levered to Unlevered company.

Answer:

Valuation of firms

Particulars	Levered Firm (₹)	Unlevered Firm (₹)
EBIT	60,000	60,000
Less: Interest on debt (10% × ₹ 2,00,000)	(20,000)	Nil
Earnings available to Equity shareholders	40,000	60,000
K_e	12.5%	12.5%
Value of Equity (S) (Earnings available to Equity shareholders/ K_e)	3,20,000	4,80,000
Debt (D)	2,00,000	Nil
Value of Firm (V) = S + D	5,20,000	4,80,000

Value of Levered company is more than that of unlevered company. Therefore, investor will sell his shares in levered company and buy shares in unlevered company. To maintain the level of risk he will borrow proportionate amount and invest that amount also in shares of unlevered company.

Investment & Borrowings	(₹)
Sell shares in Levered company ($₹ 3,20,000 \times 15\%$)	48,000
Borrow money ($₹ 2,00,000 \times 15\%$)	30,000
Buy shares in Unlevered company	78,000

Change in Return	(₹)
Income from shares in Unlevered company ($₹ 78,000 \times 12.5\%$)	9,750
Less: Interest on loan ($₹ 30,000 \times 10\%$)	3,000
Net Income from unlevered firm	6,750
Less: Income from Levered firm ($₹ 48,000 \times 12.5\%$)	6,000
Incremental Income due to arbitrage	750

Question 14**(MTP2 May 22)**

- a. The Modern Chemicals Ltd. requires ₹ 25,00,000 for a new plant. This plant is expected to yield earnings before interest and taxes of ₹ 5,00,000. While deciding about the financial plan, the company considers the objective of maximising earnings per share. It has three alternatives to finance the project- by raising debt of ₹ 2,50,000 or ₹ 10,00,000 or ₹ 15,00,000 and the balance, in each case, by issuing equity shares. The company's share is currently selling at ₹ 150, but is expected to decline to ₹ 125 in case the funds are borrowed in excess of ₹ 10,00,000. The funds can be borrowed at the rate of 10% up to ₹ 2,50,000, at 15% over

₹ 2,50,000 and up to ₹ 10,00,000 and at 20% over ₹ 10,00,000. The tax rate applicable to the company is 50%. ANALYSE, which form of financing should the company choose?

- b. "Operating risk is associated with cost structure, whereas financial risk is associated with capital structure of a business concern." Critically EXAMINE this statement.

Answer:

- a) Calculation of Earnings per share for three alternatives to finance the project

Particulars	Alternatives		
	I To raise debt of ₹2,50,000 and equity of ₹22,50,000 (₹)	II To raise debt of ₹ 10,00,000 and equity of ₹ 15,00,000 (₹)	III To raise debt of ₹ 15,00,000 and equity of ₹ 10,00,000 (₹)
Earnings before interest and tax	5,00,000	5,00,000	5,00,000
Less: Interest on debt at the rate of	25,000 (10% on ₹2,50,000)	1,37,500 (10% on ₹ 2,50,000) (15% on ₹ 7,50,000)	2,37,500 (10% on ₹2,50,000) (15% on ₹7,50,000) (20% on ₹5,00,000)
Earnings before tax	4,75,000	3,62,500	2,62,500
Less: Tax (@ 50%)	2,37,500	1,81,250	1,31,250
Earnings after tax: (A)	2,37,500	1,81,250	1,31,250
Number of shares : (B) (Refer to working note)	15,000	10,000	8,000
Earnings per share: (A)/(B)	15,833	18,125	16,406

So, the earning per share (EPS) is higher in alternative II i.e. if the company finance the project by raising debt of ₹ 10,00,000 and issue equity shares of ₹ 15,00,000. Therefore, the company should choose this alternative to finance the project.

Working Note:

Alternatives

	I	II	III
Equity financing : (A)	₹ 22,50,000	₹ 15,00,000	₹ 10,00,000
Market price per share : (B)	₹ 150	₹ 150	₹ 125
Number of equity share : (A)/(B)	15,000	10,000	8,000

b) "Operating risk is associated with cost structure whereas financial risk is associated with capital structure of a business concern".

Operating risk refers to the risk associated with the firm's operations. It is represented by the variability of earnings before interest and tax (EBIT). The variability in turn is influenced by revenues and expenses, which are affected by demand of firm's products, variations in prices and proportion of fixed cost in total cost. If there is no fixed cost, there would be no operating risk. Whereas financial risk refers to the additional risk placed on firm's shareholders as a result of debt and preference shares used in the capital structure of the concern. Companies that issue more debt instruments would have higher financial risk than companies financed mostly by equity.

Question 15

(MTP2 Dec 21)

ABC Limited is setting up a project with a capital outlay of ₹ 90,00,000. It has two alternatives in financing the project cost.

Alternative-I: 100% equity finance by issuing equity shares of ₹ 10 each

Alternative-II: Debt-equity ratio 2:1 (issuing equity shares of ₹ 10 each)

The rate of interest payable on the debts is 18% p.a. The corporate tax rate is 30%. CALCULATE the indifference point between the two alternative methods of financing.

Answer:

Calculation of Indifference point between the two alternatives of financing.

Alternative-I By issue of 9,00,000 equity shares of ₹10 each amounting to ₹ 90 lakhs. No financial charges are involved.

Alternative-II By raising the funds in the following way: Debt = ₹ 60 lakhs
Equity = ₹ 30 lakhs (3,00,000 equity shares of ₹ 10 each)

$$\text{Interest payable on debt} = 60,00,000 \times \frac{18}{100} = ₹ 10,80,000$$

The difference point between the two alternatives is calculated by:

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

$$\frac{(EBIT - 0)(1 - 0.30)}{9,00,000} = \frac{(EBIT - 10,80,000)(1 - 0.70)}{3,00,000}$$

$$\frac{EBIT(0.70)}{3} = \frac{0.70(EBIT - 10,80,000)}{1}$$

$$EBIT = 3EBIT - 32,40,000$$

$$-2 EBIT = -32,40,000$$

$$EBIT = \frac{32,40,000}{2} \quad EBIT = ₹ 16,20,000$$

Therefore, at EBIT of ₹ 16,20,000, earnings per share for the two alternatives is equal.

Question 16

(MTP2 Dec 21)

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

(a) Total investment amount to be raised ₹ 4,00,000

(b) Plans of Financing Proportion:

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

C	50%	---	50%
---	-----	-----	-----

(c) Cost of debt 10%

Cost of preference shares 10%

(d) Tax rate 30%

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

(f) Expected EBIT is ₹ 10,00,000.

You are required to DETERMINE for each plan: -

1. Earnings per share (EPS)
2. The financial break-even point.
3. Indicate if any of the plans dominate and compute the EBIT range among the plans for indifference.

Answer:

(i) Computation of Earnings per share (EPS)

Plant	A	B	C
Earnings before interest and tax (EBIT)	10,00,000	10,00,000	10,00,000
Less: Interest charges	---	(20,000) (10% × ₹ 2 Lakhs)	---
Earnings before tax (EBT)	10,00,000	9,80,000	10,00,000
Less: Tax (@ 30%)	(3,00,000)	(2,94,000)	(3,00,000)
Earnings after tax (EAT)	7,00,000	6,86,000	7,00,000
Less: Preference Dividend	---	---	(20,000) (10% × ₹ 2 Lakhs)
Earnings available for Equity shareholders (A)	7,00,000	6,86,000	6,80,000
No. of Equity shares (B)	20,000 (₹ 4 Lakhs + ₹ 20)	10,000 (₹ 2 Lakhs + ₹ 20)	10,000 (₹ 2 Lakhs + ₹ 20)

EPS ₹ [(A) ÷ (B)]	35	68.6	68
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(ii) Calculation of Financial Break-even point

Financial break-even point is the earnings which are equal to the fixed finance charges and preference dividend.

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 ₹ 20,000 and no preference dividend. Hence, the Financial Break-even point will be ₹ 20,000 (Interest charges).

Plan C: Under this plan, there is no interest payment but an after tax preference dividend of ₹ 20,000 is paid. Hence, the Financial Break- even point will be before tax earnings of ₹ 28,571 (i.e. ₹ 20,000 ÷ 0.7)

(iii) Computation of indifference point between the plans.

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

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

Where,

EBIT = Earnings before interest and tax.

I₁ = Fixed charges (interest or pref. dividend) under Alternative 1

I₂ = Fixed charges (interest or pref. dividend) under Alternative 2

T = Tax rate

E₁ = No. of equity shares in Alternative 1

E₂ = No. of equity shares in Alternative 2

Now, we can calculate indifference point between different plans of financing.

a) Indifference point where EBIT of Plan A and Plan B is equal

$$\frac{(EBIT - 0)(1 - 0.3)}{20,000} = \frac{(EBIT - 20,000)(1 - 0.3)}{10,000}$$

$$0.7 \text{ EBIT} (10,000) = (0.7 \text{ EBIT} - 14,000) (20,000)$$

$$7,000 \text{ EBIT} = 14,000 \text{ EBIT} - 28 \text{ crores}$$

$$\text{EBIT} = 40,000$$

b) Indifference point where EBIT of Plan A and Plan C is equal

$$\frac{(EBIT - 0)(1 - 0.3)}{20,000} = \frac{(EBIT - 0)(1 - 0.3) - 20,000}{10,000}$$

$$0.7 \text{ EBIT} (10,000) = (0.7 \text{ EBIT} - 20,000) (20,000)$$

$$7,000 \text{ EBIT} = 14,000 \text{ EBIT} - 40 \text{ crores}$$

$$\text{EBIT} = 57,142.86$$

c) Indifference point where EBIT of Plan B and Plan C are equal

$$\frac{(EBIT - 20,000)(1 - 0.3)}{10,000} = \frac{(EBIT - 0)(1 - 0.3) - 20,000}{10,000}$$

$$(0.7 \text{ EBIT} - 14,000) (10,000) = (0.7 \text{ EBIT} - 20,000) (10,000)$$

$$7,000 \text{ EBIT} - 14 \text{ crore} = 7,000 \text{ EBIT} - 20 \text{ crore}$$

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

Question 17

(MTP1 May 21)

HN Limited is considering total investment of ₹ 20 lakhs. You are required to CALCULATE the level of earnings before interest and tax (EBIT) at which the EPS indifference point between the following financing alternatives will occur:

- (i) Equity share capital of ₹ 12,00,000 and 14% debentures of ₹ 8,00,000.

(Or)

Capital Structure

- (ii) Equity share capital of ₹ 8,00,000, 16% preference share capital of ₹ 4,00,000 and 14% debentures of ₹ 8,00,000.

Assume the corporate tax rate is 30% and par value of equity share is ₹10 in each case.

Answer:

Computation of level of earnings before interest and tax (EBIT)

In case alternative (i) is accepted, then the EPS of the firm would be:

$$\text{EPS Alternative (i)} = \frac{\text{EBIT} - \text{Interest}(1 - \text{Tax Rate})}{\text{No. of Equity Shares}}$$

$$= \frac{(\text{EBIT} - 0.14 \times 8,00,000)(1 - 0.3)}{1,20,000 \text{ Shares}}$$

In case the alternative (ii) is accepted, then the EPS of the firm would be

$$\text{EPS Alternative (ii)} = \frac{(\text{EBIT} - \text{Interest})(1 - \text{Tax Rate}) - \text{PD}}{\text{No. of Equity Shares}}$$

$$= \frac{(\text{EBIT} - 0.14 \times 8,00,000)(1 - 0.3) - 0.16 \times 4,00,000}{80,000 \text{ Shares}}$$

In order to determine the indifference level of EBIT, the EPS under the two alternative plans should be equated as follows:

$$= \frac{(\text{EBIT} - 0.14 \times 8,00,000)(1 - 0.3)}{1,20,000 \text{ Shares}} = \frac{(\text{EBIT} - 0.14 \times 8,00,000)(1 - 0.3) - 0.16 \times 4,00,000}{80,000 \text{ Shares}}$$

=

$$\text{Or, } \frac{0.7 \text{ EBIT} - 78,400}{1,20,000} = \frac{0.7 \text{ EBIT} - 1,42,400}{80,000}$$

$$\text{Or } 1.40 \text{ EBIT} - ₹ 1,56,800 = 2.10 \text{ EBIT} - ₹ 4,27,200$$

$$\text{Or } 0.70 \text{ EBIT} = ₹ 2,70,400$$

$$\text{Or } \text{EBIT} = \frac{2,70,400}{0.7}$$

Or EBIT = ₹ 3,86,285.71 (approx.)

Question 18

(MTP Nov 19)

RPS Company presently has ₹ 36,00,000 in debt outstanding bearing an interest rate of 10 percent. It wishes to finance a ₹ 40,00,000 expansion programme and is considering three alternatives: additional debt at 12 per cent interest, preferred stock with an 11 per cent dividend, and the sale of common stock at ₹ 16 per share. The company presently has 8,00,000 shares of common stock outstanding and is in a 40 per cent tax bracket.

1. If earnings before interest and taxes are presently ₹ 15,00,000, CALCULATE earnings per share for the three alternatives, assuming no immediate increase in profitability?
2. CALCULATE indifference point between debt and common stock.

Answer:

1.

(₹ in Thousands)			
	Debt	Preferred Stock	Common Stock
EBIT	1,500	1,500	1,500
Interest on existing debt	360	360	360
Interest on new debt	480		
Profit before taxes	660	1,140	1,140
Taxes	264	456	456
Profit after taxes	396	684	684
Preferred stock dividend		440	
Earnings available to common shareholders	395	244	684
Number of shares	800	800	1,050
Earnings per share	.495	.305	.651

(ii) Mathematically, the indifference point between debt and common stock is (Rs in thousands):

$$\frac{\text{EBIT}^* - 840}{800} = \frac{\text{EBIT}^* - 360}{1,050}$$

$$\text{EBIT}^* (1,050) - ₹ 840(1,050) = \text{EBIT}^* (800) - ₹ 360 (800)$$

$$250 \text{ EBIT}^* = ₹ 5,94,000 \quad \text{EBIT}^* = ₹ 2,376$$

Question 19

(MTP1 Nov 18)

Cost of debt and preference shares is 10% each.

Tax rate - 50%

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

Total investment to be raised ₹ 40,00,000.

Expected earnings before interest and tax ₹ 18,00,000.

Proposed	Equity shares (%)	Debts (%)	Preference Shares (%)
P	100	---	---
Q	50	50	---
R	50	---	50

From the above proposals the management wants to take advice from you for appropriate plan after computing the following:

- Earnings per share
- Financial break-even-point

COMPUTE the EBIT range among the plans for indifference. Also indicate if any of the plans dominate.

Answer:

Computation of Earnings per Share (EPS)

Plans	P (₹)	Q (₹)	R (₹)
Earnings before interest & tax (EBIT)	18,00,000	18,00,000	18,00,000
Less: Interest charges	---	(2,00,000)	---
Earnings before tax (EBT)	18,00,000	16,00,000	18,00,000
Less: Tax @ 50%	(9,00,000)	(8,00,000)	(9,00,000)
Earnings after tax (EAT)	9,00,000	8,00,000	9,00,000
Less: Preference share dividend	---	---	(2,00,000)
Earnings available for equity shareholders	9,00,000	8,00,000	7,00,000
No. of equity shares	2,00,000	1,00,000	1,00,000
E.P.S	4.5	8	7

(ii) Computation of Financial Break-even Points

Proposal 'P' = 0

Proposal 'Q' = ₹ 2,00,000 (Interest charges)

Proposal 'R' = Earnings required for payment of preference share dividend i.e.

₹ 2,00,000 × 0.5 (Tax Rate) = ₹ 4,00,000

(iii) Computation of Earnings per Share (EPS)

Combination of Proposals

a) Indifference points where EBIT of proposal "P" and proposal 'Q' is equal:

$$\frac{\text{EBIT} - (1 - 0.5)}{2,00,000 \text{ Shares}} = \frac{(\text{EBIT} - 2,00,000)(1 - 0.5)}{1,00,000 \text{ Shares}}$$

$$0.5 \text{ EBIT} = \text{EBIT} - ₹ 2,00,000$$

$$\text{EBIT} = ₹ 4,00,000$$

b) Indifference points where EBIT of proposal 'P' and proposal 'R' is equal:

$$\frac{\text{EBIT} - (1 - 0.5)}{2,00,000 \text{ Shares}} = \frac{\text{EBIT}(1 - 0.5) - 2,00,000}{1,00,000 \text{ Shares}}$$

$$\frac{0.5 \text{ EBIT}}{2,00,000 \text{ Shares}} = \frac{0.5 \text{ EBIT} - 2,00,000}{1,00,000 \text{ Shares}}$$

$$0.25 \text{ EBIT} = 0.5 \text{ EBIT} - ₹ 2,00,000$$

$$\text{EBIT} = \frac{2,00,000}{0.25} = ₹ 8,00,000$$

c) Indifference points where EBIT of proposal 'Q' and proposal 'R' are equal

$$\frac{(\text{EBIT} - 2,00,000)(1 - 0.5)}{1,00,000 \text{ Shares}} = \frac{\text{EBIT}(1 - 0.5) - 2,00,000}{1,00,000 \text{ Shares}}$$

$$0.5 \text{ EBIT} - ₹1,00,000 = 0.5 \text{ EBIT} - ₹2,00,000$$

There is no indifference point between proposal 'Q' and proposal 'R'

Analysis: It can be seen that financial proposal 'Q' dominates proposal 'R', since the financial break-even-

Question 20

(MTP May 18)

Sundaram Ltd. discounts its cash flows at 16% and is in the tax bracket of 35%. For the acquisition of a machinery worth ₹10,00,000, it has two options - either to acquire the asset by taking a bank loan @ 15% p.a. repayable in 5 yearly instalments of ₹ 2,00,000 each plus interest or to lease the asset at yearly rentals of ₹ 3,34,000 for five (5) years. In both the cases, the instalment is payable at the end of the year. Depreciation is to be applied at the rate of 15% using 'written down value' (WDV) method. You are required to STATE with reason which of the financing options is to be exercised.

Year	1	2	3	4	5
P. V. Factor @ 16%	0.862	0.743	0.641	0.552	0.476

Answer:

Alternative I: Acquiring the asset by taking bank loan:

	Year	1	2	3	4	5
a)	Interest (@15% p.a. on opening balance)	1,50,000	1,20,000	90,000	60,000	30,000
	Depreciation (@15%WDV)	1,50,000	1,27,500	1,08,375	92,119	78,301
		3,00,000	2,47,500	1,98,375	1,52,119	1,08,301

b)	Tax shield (@35%)	1,05,000	86,625	69,431	53,242	37,905
	Interest less Tax shield (a)-(b)	45,000	33,375	20,569	6,758	(7,905)
	Principal Repayment	2,00,000	2,00,000	2,00,000	2,00,000	2,00,000
	Total cash outflow	2,45,000	2,33,375	2,20,569	2,06,758	1,92,095
	Discounting Factor @ 16%	0.862	0.743	0.641	0.552	0.476
	Present Value	2,11,190	1,73,398	1,41,385	1,14,130	91,437

Total P.V of cash outflow = ₹7,31,540

Alternative II: Acquire the asset on lease basis

Year	Lease Rentals (₹)	Tax Shield @ 35%	Net Cash Outflow	Discount Factor	Present Value
1	3,34,000	1,16,900	2,17,100	0.862	1,87,140
2	3,34,000	1,16,900	2,17,100	0.743	1,61,305
3	3,34,000	1,16,900	2,17,100	0.641	1,39,161
4	3,34,000	1,16,900	2,17,100	0.552	1,19,839
5	3,34,000	1,16,900	2,17,100	0.476	1,03,340
Present value of Total Cash out flow					7,10,785

By making analysis of both the alternatives, it is observed that the present value of the cash outflow is lower in alternative II by ₹ 20,755 (i.e. ₹ 731,540 - ₹ 7,10,785) Hence, it is suggested to acquire the asset on lease basis.

Question 21

(MTP May 18)

XYZ Ltd. is considering three financial plans for which the key information is as below:

(i) Total investment to be raised ₹4,00,000.

(ii) Plans of Financing Proportion

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

C	50%	---	50%
---	-----	-----	-----

(iii) Cost of debt 8%

Cost of preference shares 8%

(iv) Tax Rate is 50%

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

(vi) Expected EBIT is ₹1,60,000

DETERMINE for each plan:

(i) Earnings per share (EPS)

(ii) Financial break-even point.

(iii) COMPUTE the EBIT range among the plans A and C for point of indifference.

Answer:

(i) Computation of Earnings per Share (EPS) for each Plan

Particulars	Plan A (₹)	Plan B (₹)	Plan C (₹)
Earnings Before Interest Tax (EBIT)	1,60,000	1,60,000	1,60,000
Less: Interest on debt at 8%	---	(16,000)	---
Earnings Before Tax	1,60,000	1,44,000	1,60,000
Less: Tax at 50%	80,000	72,000	80,000
Earnings After Tax	80,000	72,000	80,000
Less: Preference Dividend at 8%	---	---	16,000
Earnings available for equity shareholders	80,000	72,000	64,000
Number of Equity Shares	20,000	10,000	10,000
Earnings per share (EPs)	4.00	7.20	6.40

(ii) Financial Break-even Point for Each Plan

Plan A: There is no fixed financial charges, hence the financial break -even point for Plan A is zero.

Plan B: Fixed interest charges is ₹16,000, hence the financial break-even point for Plan B is ₹16,000

Plan C: Fixed charge for preference dividend is ₹16,000, hence, the financial break-even point for Plan C is ₹16,000

(iii) Indifference point between Plan A and C

$$\frac{(X-0)(1-0.5)-0}{20,000} = \frac{(X-0)(1-0.5)-16,000}{10,000 \text{ Shares}}$$

$$0.5X \text{ or } \frac{0.5X}{20,000} = \frac{0.5X-16,000}{10,000} \text{ or, } 0.5X - X = -32,000 \text{ or, } 0.5X = 32,000$$

$$\text{or, } X = ₹ 64,000$$

Thus point of indifference between plan A and C is ₹64,000.

Question 22

(RTP May 22)

The following data relates to two companies belonging to the same risk class:

Particulars	Bee Limited	Cee Limited
12% Debt	₹ 27,00,000	---
Equity Capitalization Rate	---	18
Expected Net Operating Income	₹ 9,00,000	₹ 9,00,000

You are required to:

- DETERMINE the total market value, Equity capitalization rate and weighted average cost of capital for each company assuming no taxes as per M.M. Approach.
- DETERMINE the total market value, Equity capitalization rate and weighted average cost of capital for each company assuming 40% taxes as per M.M. Approach.

Answer:

a) Assuming no tax as per MM Approach.

Calculation of Value of Firms 'Bee Ltd.' and 'Cee Ltd' according to MM Hypothesis Market Value of 'Cee Ltd' [Unlevered(u)]

Total Value of Unlevered Firm (V_u) = $[NOI/K_e] = 9,00,000/0.18 = ₹ 50,00,000$ Ke

of Unlevered Firm (given) = 0.18

K_o of Unlevered Firm (Same as above = K_e as there is no debt) = 0.18

Market Value of 'Bee Ltd' [Levered Firm (I)]

Total Value of Levered Firm (V_L) = $V_u + (\text{Debt} \times \text{Nil})$

= ₹ 50,00,000 + (27,00,000 × nil) = ₹ 50,00,000

Computation of Equity Capitalization Rate and Weighted Average Cost of Capital (WACC)

Particulars	Bee Limited
Net Operating Income (NOI)	9,00,000
Less: Interest on Debt (I)	3,24,000
Earnings of Equity Shareholders (NI)	5,76,000
Overall Capitalization Rate (K_o)	0.18
Total Value of Firm ($V = NOI/K_o$)	50,00,000
Less: Market Value of Debt	27,00,000
Market Value of Equity (S)	23,00,000
Equity Capitalization Rate [$K_e = NI / S$]	0.2504
Weighted Average Cost of Capital (K_o)*	0.18
$K_o = (K_e \times S/V) + (K_d \times D/V)$	

*Computation of WACC Bee Limited

Component of Capital	Amount	Weight	Cost of Capital	WACC
Equity	23,00,000	0.46	0.2504	0.1152
Debt	27,00,000	0.54	0.12*	0.0648
Total	50,00,000			0.18

* $K_d = 12\%$ (since there is no tax) WACC = 18%

b) Assuming 40% taxes as per MM Approach

Calculation of Value of Firms 'Bee Ltd.' and 'Cee Ltd' according to MM

Hypothesis Market Value of 'Cee Ltd' [Unlevered(u)]

Capital Structure

Total Value of unlevered Firm (V_u) = $[\text{NOI} (1 - t) / K_e] = 9,00,000 (1 - 0.40) / 0.18$
 $= ₹ 30,00,000$

K_e of unlevered Firm (given) = 0.18

K_o of unlevered Firm (Same as above = K_e as there is no debt) = 0.18

Market Value of 'Bee Ltd' [Levered Firm (I)]

Total Value of Levered Firm (V_L) = $V_u + (\text{Debt} \times \text{Tax})$

$= ₹ 30,00,000 + (27,00,000 \times 0.4) = ₹ 40,80,000$

Computation of Weighted Average Cost of Capital (WACC) of 'Cee Ltd.'

= 18% (i.e. $K_e = K_o$)

Computation of Equity Capitalization Rate and Weighted Average Cost of Capital (WACC) of Bee Ltd

Particulars	Bee Limited
Net Operating Income (NOI)	9,00,000
Less: Interest on Debt (I)	3,24,000
Earnings Before Tax (EBT)	5,76,000
Less: Tax @ 40%	2,30,400
Earnings of Equity Shareholders (NI)	3,45,600
Total Value of Firm (V) as calculated above	40,80,000
Less: Market Value of Debt	27,00,000
Market Value of Equity (S)	13,80,000
Equity Capitalization Rate [$K_e = \text{NI} / S$]	0.2504
Weighted Average Cost of Capital (K_o)*	13.23
$K_o = (K_e \times S/V) + (K_d \times D/V)$	

Computation of WACC Bee Ltd.

Component of Capital	Amount	Weight	Cost of Capital	WACC
Equity	13,80,000	0.338	0.2504	0.0846
Debt	27,00,000	0.662	0.072*	0.0477
Total	40,80,000			0.1323

* $K_d = 12\% (1 - 0.4) = 12\% \times 0.6 = 7.2\%$ WACC = 13.23%

Question 23

(RTP Dec 21)

Blue Ltd., an all equity financed company is considering the repurchase of ₹ 275 lakhs equity shares and to replace it with 15% debentures of the same amount. Current market value of the company is ₹ 1,750 lakhs with its cost of capital of 20%. The company's Earnings before Interest and Taxes (EBIT)

Assuming the corporate tax rate as 30%, you are required to CALCULATE the impact on the following on account of the change in the capital structure as per Modigliani and Miller (MM) Approach:

- (i) Market value of the company
- (ii) Overall Cost of capital
- (iii) Cost of equity

Answer:

Workings:

$$\text{Market Value of Equity} = \frac{\text{Net Income (NI) for Equityholders}}{K_e}$$

$$₹ 1,750 \text{ Lakhs} = \frac{\text{Net Income (NI) for Equityholders}}{0.20}$$

$$\text{Net Income to equity holders/EAT} = ₹ 350 \text{ lakhs}$$

$$\text{Therefore, EBIT} = \frac{\text{EAT}}{(1-t)} = \frac{350 \text{ Lakhs}}{(1-0.3)} = ₹ 500 \text{ Lakhs}$$

Income Statement

	All Equity (₹ in Lakhs)	Equity & Debt (₹ in Lakhs)
EBIT (as calculated above)	500	500
Interest on ₹ 275 lakhs @ 15%	---	41.25
EBT	---	458.75
Tax @ 30%	500	137.63
Income available to equity holders	150	321.12

350

(i) Market value of the company

Market value of levered firm = Value of unlevered firm + Tax Advantage

= ₹ 1,750 lakhs + (₹ 275 lakhs × 0.3) = ₹ 1,832.5 lakhs

Change in market value of the company = ₹ 1,832.5 lakhs - ₹ 1,750 lakhs

= ₹ 82.50 lakhs

The impact is that the market value of the company has increased by ₹ 82.50 lakhs due to replacement of equity with debt

(ii) Overall Cost of Capital

Market Value of Equity = Market value of levered firm - Equity repurchased

= ₹ 1,832.50 lakhs - ₹ 275 lakhs = ₹ 1,557.50 lakhs

Cost of Equity (K_e) = (Net Income to equity holders / Market value of equity) × 100

= (₹ 321.12 lakhs / ₹ 1,557.50 lakhs) × 100 = 20.62%

Cost of debt (K_d) = $I(1 - t) = 15(1 - 0.3) = 10.50\%$

Component of Capital	Amount (₹ in Lakhs)	Cost of Capital	Weight	WACC (K_o)
Equity	1,557.50	20.62	0.85	17.53
Debt	275.00	10.50	0.15	1.58
Total	1,832.50		1	19.11

The impact is that the Overall Cost of Capital or K_o has fallen by 0.89% (20% - 19.11%) due to the benefit of tax relief on debt interest payment.

(iii) Cost of Equity

The impact is that cost of equity has risen by 0.62% (20.62% - 20%) due to the presence of financial risk i.e. introduction of debt in capital structure.

Note: Cost of Capital and Cost of equity can also be calculated with the help of following formulas, though there will be no change in the final answers.

Cost of Capital (K_o) = $K_{eu} [1 - (t \times L)]$ Where,

K_{eu} = Cost of equity in an unlevered company

t = Tax Rate

L = $\frac{\text{Debt}}{0.2 \text{ Debt} + \text{Equity}}$

So, K_o = $0.20 + \left[1 - \left(0.30 \times \frac{275 \text{ Lakhs}}{1,832.5 \text{ Lakhs}} \right) \right]$

= 0.191 or 19.10% (approx.)

Cost of Equity (K_e) = $K_{eu} + (K_{eu} - K_d) \frac{\text{Debt}(1-t)}{\text{Equity}}$

Where,

K_{eu} = Cost of equity in an unlevered company

K_d = Cost of Debt

t = Tax Rate

So, $K_e = 0.20 + (0.20 - 0.15) \frac{275 \text{ lakhs} (1 - 0.3)}{1,557.5 \text{ lakhs}} = 0.2062$ or 20.62%

Question 24

(RTP July 21)

Zordon Ltd. has net operating income of ₹5,00,000 and total capitalization of ₹ 50,00,000 during the current year. The company is contemplating to introduce debt financing in capital structure and has various options for the same. The following information is available at different levels of debt value:

Debt Value (₹)	Interest Rate (%)	Equity Capitalisation Rate (%)
0	---	10.00
5,00,000	6.0	10.50
10,00,000	6.0	11.00

15,00,000	6.2	11.30
20,00,000	7.0	12.40
25,00,000	7.5	13.50
30,00,000	8.0	16.00

Assuming no tax and that the firm always maintains books at book values, you are REQUIRED to calculate:

- Amount of debt to be employed by firm as per traditional approach.
- Equity capitalization rate, if MM approach is followed.

Answer:

a) Amount of debt to be employed by firm as per traditional approach

Calculation of Equity, W_d and W_e

Total Capital (₹)	Debt (₹)	W_d	Equity value (₹)	W_d
(a)	(b)	(a)/(b)	(c) = (a) – (b)	(c)/(a)
50,00,000	0	---	50,00,000	1.0
50,00,000	5,00,000	0.1	45,00,000	0.9
50,00,000	10,00,000	0.2	40,00,000	0.8
50,00,000	15,00,000	0.3	35,00,000	0.7
50,00,000	20,00,000	0.4	30,00,000	0.6
50,00,000	25,00,000	0.5	25,00,000	0.5
50,00,000	30,00,000	0.6	20,00,000	0.4

Statement of Weighted Average Cost of Capital (WACC)

K_e	W_e	K_d	W_d	$K_e W_e$	$K_d W_d$	K_e
(1)	(2)	(3)	(4)	(5) = (1) × (2)	(6) = (3) × (4)	(7) = (5) + (6)
0.100	1.0	---	---	0.100	---	0.100
0.105	0.9	0.060	0.1	0.095	0.006	0.101
0.110	0.8	0.060	0.2	0.088	0.012	0.100
0.113	0.7	0.062	0.3	0.079	0.019	0.098
0.124	0.6	0.070	0.4	0.074	0.028	0.102
0.135	0.5	0.075	0.5	0.068	0.038	0.106
0.160	0.4	0.080	0.6	0.064	0.048	0.112

So, amount of Debt to be employed = ₹ 15,00,000 as WACC is minimum at this level of debt i.e. 9.8%.

b) As per MM approach, cost of the capital (K_o) remains constant and cost of equity increases linearly with debt.

$$\text{Value of a firm} = \frac{\text{Net Operation Income (NOI)}}{K_o}$$

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

$$K_o = \frac{5,00,000}{50,00,000} = 10\%$$

Statement of Equity Capitalization rate (k_e) under MM approach

Debt (₹)	Equity (₹)	Debt/Equity	K_e	K_d	$K_e - K_d$	$K_e = K_o + (K_e - K_d) \times \text{Debt/Equity}$
(1)	(2)	(3) = (1)/(2)	(4)	(5)	(6) = (4) - (5)	(7) = (4) + (6) × (3)
0	50,00,000	0	0.10	---	0.100	0.100
5,00,000	45,00,000	0.11	0.10	0.060	0.040	0.104
10,00,000	40,00,000	0.25	0.10	0.060	0.040	0.110
15,00,000	35,00,000	0.43	0.10	0.062	0.038	0.116
20,00,000	30,00,000	0.67	0.10	0.070	0.038	0.120
25,00,000	25,00,000	1.00	0.10	0.075	0.025	0.125
30,00,000	20,00,000	1.50	0.10	0.080	0.020	0.130

Question 25

(RTP Nov 18)

Rounak Ltd. is an all equity financed company with a market value of ₹ 25,00,000 and cost of equity (K_e) 21%. The company wants to buyback equity shares worth ₹ 5,00,000 by issuing and raising 15% perpetual debt of the same amount. Rate of tax may be taken as 30%. After the capital

restructuring and applying MM Model (with taxes), you are required to
COMPUTE:

1. Market value of J Ltd.

2. Cost of Equity (K_e)

3. Weighted average cost of capital (using market weights) and comment on it.

Answer:

Value of a company (V) = Value of equity (S) + Value of debt (D)

$\text{₹ } 25,00,000 = \frac{\text{Net Income (NI)}}{K_e} + 5,00,000$

Or, Net Income (NI) = $0.21 (\text{₹ } 25,00,000 - \text{₹ } 5,00,000)$

Market Value of Equity = ₹ 25,00,000

$K_e = 21\%$

$\frac{\text{Net Income (NI) for Equityholders}}{K_e} = \text{Market Value of Equity}$

$\frac{\text{Net Income (NI) for Equityholders}}{0.21} = \text{₹ } 25,00,000$

Net income for equity holders = ₹ 5,25,000

EBIT = $5,25,000 / 0.7$ = ₹ 7,50,000

	All Equity (₹)	Debt & Equity (₹)
EBIT	7,50,000	7,50,000
Interest to debt-holders	---	(75,000)
EBT	7,50,000	6,75,000
Taxes (30%)	(2,25,000)	(2,02,500)
Income available to equity shareholders	5,25,000	4,72,500
Income to debt holders plus income available to shareholders	5,25,000	5,47,500

Present value of tax-shield benefits = ₹ 5,00,000 × 0.30 = ₹ 1,50,000

(i) Value of Restructured firm

= ₹ 25,00,000 + ₹ 1,50,000 = ₹ 26,50,000

(ii) Cost of Equity (K_e)

Total Value = ₹ 26,50,000

Less: Value of Debt = ₹ 5,00,000

Value of Equity = ₹ 21,50,000

$K_e = \frac{4,72,500}{21,50,000} = 0.219 = 21.98\%$

(iii) WACC (on market value weight)

Cost of Debt (after tax) = 15% (1 - 0.3) = 0.15 (0.70) = 0.105 = 10.5%

Component of Costs	Amount (₹)	Cost of Capital (%)	Weight	WACC (%)
Equity	21,50,000	21.98	0.81	17.80
Debt	5,00,000	10.50	0.19	2.00
	26,50,000			19.80

Comment: At present the company is all equity financed. So, $K_e = K_o$ i.e. 21%. However, after restructuring, the K_o would be reduced to 19.80% and K_e would increase from 21% to 21.98%.

Question 26

(RTP May 18)

Company P and Q are identical in all respects including risk factors except for debt/equity, company P having issued 10% debentures of ₹ 18 lakhs while company Q is unlevered. Both the companies earn 20% before interest and taxes on their total assets of ₹ 30 lakhs.

Assuming a tax rate of 50% and capitalization rate of 15% from an all-equity company.

Required

CALCULATE the value of companies' P and Q using

Capital Structure

- (i) Net Income Approach and
(ii) Net Operating Income Approach.

Answer:

(i) Valuation under Net Income Approach

Particulars	P Amount (₹)	Q Amount (₹)
Earnings before Interest & Tax (EBIT) (20% of ₹ 30,00,000)	6,00,000	6,00,000
Less: Interest (10% of ₹ 18,00,000)	1,80,000	
Earnings before Tax (EBT)	4,20,000	6,00,000
Less: Tax @ 50%	2,10,000	3,00,000
Earnings after Tax (EAT) (available to equity holders)	2,10,000	3,00,000
Value of equity (capitalized @ 15%)	14,00,000 (2,10,000 × 100/15)	20,00,000 (3,00,000 × 100/15)
Add: Total Value of debt	18,00,000	Nil
Total Value of Company	32,00,000	20,00,000

(ii) Valuation of Companies under Net Operating Income Approach

Particulars	P Amount (₹)	Q Amount (₹)
Capitalisation of earnings at 15% $\left(\frac{1-0.5}{5}\right)$	20,00,000	20,00,000
Less: Value of debt {18,00,000 (1 - 0.5)}	9,00,000	Nil
Value of equity	11,00,000	20,00,000
Add: Total Value of debt	18,00,000	Nil
Total Value of Company	29,00,000	20,00,000

Question 27

(MTP2 May 23)

Following data is available in respect of two companies having same business risk: Capital employed = ₹ 12,00,000, EBIT = ₹ 2,40,000 and $K_e = 15\%$.

Sources	Dumble Limited	Jumble Limited
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Debt (@12%)	4,00,000	Nil
Equity	8,00,000	12,00,000

An investor is holding 20% shares in the levered company. CALCULATE the increase in annual earnings of investor if arbitrage process is undertaken.

Also EXPLAIN the arbitrage process if $K_e = 20\%$ for Dumbo Ltd instead of 15%.

Answer:

(i) Valuation of Firms

Particulars	Dumble Limited	Jumble Limited
EBIT	2,40,000	2,40,000
Less: Interest on debt ($12\% \times ₹ 4,00,000$)	48,000	Nil
Earnings available to Equity shareholders	1,92,000	2,40,000
K_e	15%	15%
Value of Equity (S)	12,80,000	16,00,000
Debt (D)	4,00,000	Nil
Value of Firm (V) = S + D	16,80,000	16,00,000

Value of Levered company is more than that of unlevered company. Therefore, investor will sell his shares in levered company and buy shares in unlevered company. To maintain the level of risk he will borrow proportionate amount and invest that amount also in shares of unlevered company.

(ii) Investment & Borrowings

(₹)

Sell shares in Levered company ($12,80,000 \times 20\%$)	2,56,000
Borrow money ($4,00,000 \times 20\%$)	80,000
Buy shares in Unlevered company	3,36,000

(iii) Change in Return

Income from shares in Unlevered company	
$(2,40,000 \times 3,36,000 / 16,00,000)$	50,400

Less: Interest on loan ($80,000 \times 12\%$)	9,600
Net Income from unlevered firm	40,800
Less: Income from Levered firm ($1,92,000 \times 20\%$)	38,400
Incremental Income due to arbitrage	2,400
Arbitrage process if $K_e = 20\%$	

(iv) Valuation of Firm

Particulars	Dumble Limited	Jumble Limited
EBIT	2,40,000	2,40,000
Less: Interest on debt ($12\% \times ₹ 4,00,000$)	48,000	Nil
Earnings available to Equity shareholders	1,92,000	2,40,000
K_e	20%	15%
Value of Equity (S) (Earnings available to Equity shareholders/ K_e)	9,60,000	16,00,000
Debt (D)	4,00,000	Nil
Value of Firm (V) = S + D	13,80,000	16,00,000

Value of unlevered company is more than that of levered company. Therefore, investor will sell his shares in unlevered company and buy proportionate shares and debt in levered company i.e. 20% share.

(v) Investment & Borrowings

Sell shares in unlevered company ($16,00,000 \times 20\%$)	3,20,000
Buy shares in levered company ($9,60,000 \times 20\%$)	1,92,000
Buy Debt of levered company	1,28,000

(vi) Change in Return

(₹)

Income from shares in levered company ($1,92,000 \times 20\%$)	38,400
Add: Interest on debt of levered ($1,28,000 \times 12\%$)	15,360

Net Income from levered firm	53,760
Less: Income from unlevered firm (2,40,000 × 20%)	48,000
Incremental Income due to arbitrage	5,760

Question 28**(MTP1 Nov 22)**

(a) Leo Ltd. has a net operating income of ₹ 21,60,000 and the total capitalisation of ₹ 120 lakhs. The company is evaluating the options to introduce debt financing in the capital structure and the following information is available at various levels of debt value.

Debt Value (₹)	Interest Rate (%)	Equity Capitalisation Rate (%)
0	N.A.	12.00
10,00,000	7.00	12.50
20,00,000	7.00	13.00
30,00,000	7.50	13.50
40,00,000	7.50	14.00
50,00,000	8.00	15.00
60,00,000	8.50	16.00
70,00,000	9.00	17.00
80,00,000	10.00	20.00

You are required to COMPUTE the equity capitalization rate if MM approach is followed. Assume that the firm operates in zero tax regime and calculations to be based on book values.

(b) BRIEF OUT the remedies for Over-Capitalisation.

Answer:

(a) As per MM approach, cost of the capital (K_o) remains constant, and cost of equity increases linearly with debt.

$$\text{Value of a Firm} = \frac{\text{NOI}}{K_o} = \frac{21,60,000}{K_o} = 1,20,00,000$$

$$K_o = \frac{21,60,000}{1,20,00,000} = 18\%$$

Under MM approach, $K_e = K + \frac{D}{E}(K_o - K_d)$

Statement of equity capitalization under MM approach

Debt Value (₹)	Equity Value (₹)	Debt Equity	Kd (%)	Ko (%)	Ko - Kd (%)	$K_e = K_o + \frac{K_o - K_d}{D/E} (D/E)$ (%)
---	1,20,00,000	0.0000	N.A.	18.00	18.00	18.00
10,00,000	1,10,00,000	0.0909	7.00	18.00	11.00	19.00
20,00,000	1,00,00,000	0.2000	7.00	18.00	11.00	20.20
30,00,000	90,00,000	0.3333	7.50	18.00	10.50	21.50
40,00,000	80,00,000	0.5000	7.50	18.00	10.50	23.25
50,00,000	70,00,000	0.7143	8.00	18.00	10.00	25.14
60,00,000	60,00,000	1.0000	8.50	18.00	9.50	27.50
70,00,000	50,00,000	1.4000	9.00	18.00	9.00	30.60
80,00,000	40,00,000	2.0000	10.00	18.00	8.00	34.00

(b) Remedies for Over-Capitalisation: Following steps may be adopted to avoid the negative consequences of over-capitalisation.

- Company should go for thorough reorganization.
- Buyback of shares.
- Reduction in claims of debenture-holders and creditors.
- Value of shares may also be reduced. This will result in sufficient funds for the company to carry out replacement of assets.

Question 29

(MTP2 May 21)

Kee Ltd. and Lee Ltd. are identical in every respect except for capital structure. Kee Ltd. does not employ debt in its capital structure, whereas Lee Ltd. employs 12% debentures amounting to ₹ 20 lakhs. Assuming that:

- All assumptions of MM model are met;

- (ii) The income tax rate is 30%;
- (iii) EBIT is ₹ 5,00,000 and
- (iv) The equity capitalization rate of
- (v) Kee Ltd. is 25%.

CALCULATE the average value of both the Companies.

Answer:

Kee Ltd. (pure Equity) i.e. unlevered company:

$$EAT = EBT (1 - t)$$

$$= EBIT (1 - 0.3) = ₹ 5,00,000 \times 0.7 = ₹ 3,50,000$$

(Here, EBIT = EBT as there is no debt)

$$\begin{aligned} \text{Value of unlevered company Kee Ltd.} &= \frac{EAT}{\text{Equity Capitalisation Rate}} \\ &= \frac{3,50,000}{25\%} = ₹ 14,00,000 \end{aligned}$$

Lee Ltd. (Equity and Debt) i.e. levered company:

$$\text{Value of levered company} = \text{Value of Equity} + \text{Value of Debt}$$

$$= ₹ 14,00,000 + (₹ 20,00,000 \times 0.3)$$

$$= ₹ 20,00,000$$

Question 30

(MTP May 20)

A&R Ltd. is an all equity financed company with a market value of ₹25,000 lakhs and cost of equity (K_e) 18%. The company wants to buyback equity shares worth ₹5,000 Lakhs by issuing and raising 10% debentures redeemable at 10% premium after 5 years. Rate of tax may be taken as 35%. Applying Modigliani-Miller (MM) (with taxes), you are required to **CALCULATE** after restructuring:

- (i) Market value of A&R Ltd.

(ii) Cost of Equity (K_e)

(iii) Weighted average cost of capital (using market weights).

Answer:

Value of a company (V) = Value of equity (S) + Value of debt (D)

A&R Ltd. is all equity financed company; its value would equal to value of equity.

Market value of equity = $\frac{\text{Net Income (NI)}}{K_e}$

In the question, market value of equity is ₹25,000 Lakhs and cost of equity (K_e) is 18%. The Net Income (NI) is calculated as follows:

$\frac{\text{Net Income (NI) for Equityholders}}{K_e} = \text{Market Value of Equity}$

$\frac{\text{Net Income (NI) for Equityholders}}{0.18} = 25,000 \text{ KWH}$

Net income for equity holders = 4,500 lakh

Net Income (NI) is after tax income, the before tax income would be

EBT $\frac{4,500 \text{ Lakhs}}{(1-0.35)} = 6,923.07 \text{ Lakhs}$

Since, A&R Ltd. is an all equity financed and there is no interest expense, so here EBT is equal to EBIT. After issuing 10% debentures, the A&R Ltd would become a levered company.

(i) The value of A&R Ltd. after issuing debentures would be calculated as follows:

Value of a levered company (V_g)

= Value of an unlevered company (V_u) + Tax benefit (TB)

= ₹25,000 lakh + (₹5,000 lakh × 35%)

= ₹25,000 + ₹1,750 = ₹26,750

(ii) Cost of Equity (Ke)

Total Value = ₹26,750 lakh

Less: Value of Debt = ₹ 5,000 lakh

Value of Equity = ₹ 21,750

$$K_e = \frac{4,175 \text{ Lakhs}}{21,750 \text{ Lakhs}} = 0.1919 = 19.19\%$$

(iii) WACC (on market value weight)

Components of Costs	Amount (Lakhs)	Cost of Capital (%)	Weight	WACC (%)
Equity	21,750	19.19	0.81	15.54
Debt	5,000	8.10	0.19	1.54
	26,750			17.08

Working Notes:

1.

	All Equity	Dent & Equity
EBIT (as calculated above)	6,923.07	6,923.07
Interest to debt-holders	---	500.00
EBT	6,923.07	6,423.07
Taxes (35%)	2,423.07	2,248.07
Income available to equity shareholders	4,500.00	4,175.00
Income to debt holders plus income available to shareholders	4,500.00	4,675.00

2) Cost of Debenture (Kd) =

$$\frac{500(1-0.35) + \left(\frac{5,500-5,000}{5} \right)}{\left(\frac{5,500-5,000}{2} \right)} = \frac{325+100}{5,250} = 0.081 \text{ or } 8.1\%$$

Question 31

(MTP Nov 19)

A Ltd. and B Ltd. are identical in every respect except capital structure. A Ltd. does not employ debts in its capital structure whereas B Ltd. employs 12% Debentures amounting to ₹100 lakhs. Assuming that:

- (i) All assumptions of M-M model are met;
- (ii) Income-tax rate is 30%;
- (iii) EBIT is ₹ 25,00,000 and
- (iv) The Equity capitalization rate of 'A' Ltd. is 20%.

CALCULATE the value of & also find out the Weighted Average Cost of Capital for both the companies.

Answer:

- (i) Calculation of Value of 'A Ltd.' and 'B Ltd.' according to MM Hypothesis

Market Value of 'A Ltd' (Unlevered)

$$V_u = \frac{EBIT(1-t)}{K_e} = \frac{25,00,000(1-0.30)}{20\%} = \frac{17,50,000}{20\%} = ₹ 87,50,000$$

Market Value of 'B Ltd.' (Levered) $V_g = V_u + TB$

$$= ₹ 87,50,000 + (₹1,00,00,000 \times 0.30)$$

$$= ₹ 87,50,000 + ₹30,00,000 = ₹ 1,17,50,000$$

- (ii) Computation of Weighted Average Cost of Capital (WACC)

WACC of 'A Ltd.' = 20% (i.e. $K_e = K_o$)

WACC of 'B Ltd.'

	B Limited (₹)
EBIT	25,00,000
Interest to Debt holders	(12,00,000)
EBT	13,00,000
Taxes @ 30%	(3,90,000)
Income available to Equity Shareholders	9,10,000
Total Value of Firm	1,17,50,000
Less: Market Value of Debt	(1,00,00,000)

Market Value of Equity	17,50,000
Return on equity (K_e) = $9,10,000 / 17,50,000$	0.52

Computation of WACC B. Ltd

Components of Costs	Amount	Weight	Cost of Capital (%)	WACC
Equity	17,50,000	0.149	0.52	0.0775
Debt	1,00,00,000	0.851	0.084*	0.0715
Total	1,17,50,000			0.1490

* $K_d = 12\% (1 - 0.3) = 12\% \times 0.7 = 8.4\%$; WACC = 14.90%

Question 32

(MTP2 May 19)

The proportion and required return of debt and equity was recorded for a company with its increased financial leverage as below:

Debt (%)	Required Return (K_d) (%)	Equity (%)	Required Return (K_e) (%)	Weighted Average Cost of Capital (WACC) (K_o)(%)
0	5	100	15	15
20	6	80	16	?
40	7	60	18	?
60	10	40	23	?
80	15	20	35	?

You are required to complete the table and IDENTIFY which capital structure is most beneficial for this company. (Based on traditional theory, i.e., capital structure is relevant).

Answer:

Computation of Weighted Average Cost of Capital (WACC) for each level of Debt-equity mix.

Debt (%)	Required return (K_d)(%)	Equity (%)	Required return (K_e) (%)	$K_d \times$ Proportion of debt + K_e Proportion and equity	Weighted Average Cost
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					of Capital (WACC) (K _o)(%)
0	5	100	15	0%(5%) + 100%(15%)	15
2	6	80	16	20%(6%) + 80%(16%)	14
4	7	60	18	40%(7%) + 60%(18%)	13.6
6	10	40	23	60%(10%) + 40%(23%)	15.2
8	15	20	35	80%(15%) + 20%(35%)	19

The optimum mix is 40% debt and 60% equity, as this will lead to lowest WACC value i.e., 13.6%.