Lesson 5

Weighted Average Cost of Capital

Objectives of the lesson

After studying this lesson, students will be able to:

- Understand concept and calculation of weighted average cost of capital,
- Describe significance of the cost of capital in decision making, and
- Understand need and rationale of EBIT – EPS analysis and point of indifference.

1.0 Weighted Average Cost of Capital (WACC)

To maintain control over business, balance financial risk, and to keep cost of capital under manageable limits, a company usually does not procure entire funds from single source of finance. Rather, it designs a structure consisting of various sources of finance. The composite or overall cost of capital of a firm is the weighted average of the costs of various sources of funds. Weights are taken to be the proportion of each source of funds in the capital structure.

The important steps taken for calculating WACC are as follows.

- Determine the source of funds to be raised.
- Compute cost of specific source of funds.
- Assign weight to specific source of funds.
- Multiply the cost of each source by the appropriate assigned weights.
- Add individual source weight cost to get cost of capital.

Thus, WACC is calculated as:

$$Ko = K_1.W_1 + K_2.W_2 + K_3.W_3 + \ldots\ldots\ldots K_n.W_n$$

Here: Ko is overall after-tax cost of capital (WACC), K_1, K_2, K_3, and K_n are after tax cost of individual capital component, and W_1, W_2,W_3, and W_n are the weights associated with individual capital component.

The weights can be assigned in following ways.

- Marginal Weights: These represent the percentage share of the sources of finance, the firm intends to employ. These are more concerned with new or incremental capital.
- Historical Weights: This method uses relative proportions of various sources to the existing capital structure. It assumes that existing structure is optimal, it will follow in future also.
- Book Value Weights: Weight to various sources of capital is assigned by calculating the proportion of the book value of the source and the book value of total capital.
- Market Value Weights: Under this method, weights are the relative proportions of the market value of various sources of capital to the total capital of the firm.

In financial decision making, the cost of capital should be on an after-tax basis. Therefore, the components cost to be used to measure the weighted cost of capital should be the after-tax costs. If we assume that a firm has only debt and equity in its capital structure, then its weighted average capital (K_0) will be:

$$K_o = K_d(1-t)W_d + K_pW_p + K_eW_e$$

Here, K_d, K_p, and K_e denote cost of debt/ debenture, cost of preference capital, and the cost of equity. W_d, W_p, and W_e are respective weights; and t is corporate tax rate.

WACC is also calculated by applying following formula.

$$WACC = \frac{K_lW_l + K_dW_d + K_pW_p + K_eW_e}{W_l + W_d + W_p + W_e}$$

Here: WACC = After-tax composite cost of capital, X_l = After-tax cost of long-term debt, X_d = After-tax cost of debentures, X_p = After-tax cost of preference share capital, X_p = After-tax cost of equity capital, W_l, W_d, W_p and W_e is proportion (or weight) of long-term loan, debentures, preference share capital and equity share capital in total capital.

This formula can also be written as:

$$WACC = \frac{\sum W_iK_i}{\sum W}$$

2.0 Significance of Cost of Capital

Cost of capital is widely used for decision making in every commercial organization. Some of its important implications are as follows.

- Designing capital structure: Capital structure involves determination of proportion of debt and equity in capital structure where cost of capital is minimum. Cost of capital is helpful in formulating an economical and optimal capital structure for a firm. The measurement of specific cost of each source of fund and calculation of weighted average cost of capital helps to come to a balanced capital structure.
- Financing decisions: The debt policy of a firm is significantly influenced by the cost consideration. While designing firm's capital structure financial executives always keep in mind minimization of the overall cost of capital and to maximize value of the firm. Thus, is useful in deciding about the alternatives and methods of financing at a point of time.
- Investment evaluation: Capital expenditure means investment in long term projects like investment on new machinery. It is also known as capital budgeting expenditure. Capital budgeting decisions require a financial standard or cost of capital for evaluation. Wilson, states that the cost of capital is a concept, which should be expressed in quantitative terms if it is to be useful, as a cut-off rate for capital expenses. In the NPV method, an investment project is accepted if it has a positive NPV. NPV is calculated by discounting

its expected cash flows by the cost of capital. In this sense, cost of capital is used as discounting rate for evaluating the desirability of the investment proposal. In IRR method, the investment project is accepted if it has an internal rate of return greater than the cost of capital. In this context, the cost of capital is the minimum required rate of return on the investment project. This is why it is known as cut-off rate, target rate, and hurdle rate.

- Financial performance appraisal: Cost of capital framework is also used to evaluate financial performance of the firm. it involves a comparison of actual profitability of the investment projects undertaken by the firm with the projected overall cost of capital, and the appraisal of the actual cost incurred by management in raising the required funds. If the actual profitability rate is more than the projected cost of capital, then the financial performance may said to be satisfactory and vice-versa.
- Designing optimal credit policy: Cost of capital also plays useful role in dividend decision and investment in current assets. The decision regarding relaxing or tightening credit policy are taken only after considering cost of funds blocked with customers for extended period.

3.0 EBIT - EPS analysis

EBIT - EPS analysis gives a scientific basis for comparison among various financial plans and shows ways to maximize EPS. It is defined as a tool of financial planning that evaluates various alternatives of financing a project under varying levels of EBIT and suggests the best alternative having highest EPS and determines the most profitable level of EBIT.

We know that a firm can finance its investment from various sources such as borrowed capital or equity capital. The proportion of various sources may also be different under various financial plans. EBIT-EBT analysis compares alternative methods of financing at different levels of EBIT and examines the effect of alternative financing plans on the EPS.

EBIT-EPS analysis helps a firm in determining optimum financial planning having highest EPS. It is useful in Financial Planning, performance evaluation, determining optimum mix.

4.0 Point of Indifference

The indifference point, often called as a financial breakeven point, is highly important in financial planning because, at EBIT amounts in excess of the EBIT indifference level, the more heavily levered financing plan will generate a higher EPS. On the other hand, at EBIT amounts below the EBIT indifference points the financing plan involving less leverage will generate a higher EPS. Indifference point refers to that level of EBIT at which EPS of alternative financing plans is same. According to James C. Van Home, indifference point refers to that EBIT level at which EPS remains the same irrespective of debt equity mix.

The management of a firm is indifferent in choosing any of the alternative financial plans at this level because all the financial plans are equally desirable. The indifference point is the

cut-off level of EBIT below which financial leverage is disadvantageous. Beyond the indifference point level of EBIT, the benefit of financial leverage with respect to EPS starts operating. The indifference level of EBIT is significant because the financial planner may decide to take the debt advantage if the expected EBIT crosses this level. Beyond this level of EBIT, the firm will be able to magnify the effect of increase in EBIT on the EPS. In other words, financial leverage will be favorable beyond the indifference level of EBIT and will lead to an increase in the EPS. If the expected EBIT is less than the indifference point, then the financial planners will opt for equity for financing projects, because below this level, EPS will be more for less levered firm. The EBIT at the point of indifference can be calculated in different ways.

In case of all equity versus equity and Debt

$$\frac{X(1-t)}{N_1} = \frac{(X-I)(1-t)}{N_2}$$

In case of all equity versus equity, debentures & preference share capital

$$\frac{X(1-t)}{N_1} = \frac{(X-I)(1-t)-PD}{N_2}$$

Here: X = EBIT, I = Interest, PD = Preference Dividend, t = Tax Rate, and N = Number of Equity Shares

Summary

A company has to employ a combination of creditors and owners funds. The composite cost of capital lies between the least and the most expensive funds. This approach enables the maximization of profits and the wealth of the equity shareholders by investing the funds in projects earning in excess of the overall cost of capital. The composite cost of capital implies an average of the costs of each of the source of funds employed by the firm properly weighted by the proportion they hold in the firm's capital structure. An important analytical tool in financial analysis is indifference point at which the EPS/ market price is the same for different financial plans under consideration. It helps the management in designing alternative financing plans which can be considered without having impact on shareholders earnings.

Self check Questions

1. What do you mean by cost of capital? Explain objectives and significance of calculating cost of capital.
2. Explain utility of the concept of cost of capital in: (a) Designing capital structure (b) Allocation of financial resources, and (c) Investment decisions
3. Write short notes on (a) Weighted average cost of capital, (b) EBIT-EPS analysis, and (c) Point of Indifference.
4. Attempt related practical problems by refering suggested readings.

Practical Problems on Weighted Average Cost of Capital

Illustration # 1: A firm is planning to start a new production house. It has estimated capital requirement of Rs. 80,00,000 to be invested in capital assets and permanent working capital. The estimated earnings before interest and tax are Rs. 14,25,000. The firm expects th at the earnings will remain stable over following few years. The firm is considering following sources to arrange funds.

- By Equity Capital – Rs. 25,00,000 (Shares of Rs. 10 each). The flotation cost of equity (on advertisement, printing, brokerage and commission) is estimated at 3 percent.
- By 10% Preference Share Capital – Rs. 10,00,000 (Shares of Rs. 100 each to be issued at par and redeemable after 5 years at 3 percent premium). The issue expenses are estimated at 3 percent.
- By 9% Debenture – Rs. 20,00,000 (Debentures of Rs. 100 each to be issued at 2 percent discount and redeemable after 5 years at par). The issue expenses are estimated at 2 percent.
- By Long-term Loan from State Bank of India– (Remaining amount at 8.5 percent interest). The expenses on arranging loan are estimated at 1.5 percent.

You are required to justify capital estimates and calculate WACC. The rate of return of the industry is 19 percent and corporate tax rate is 40 percent. Firm has decided to follow 70 percent dividend Payout.

Solution:

Justification of Capital Needs

$$\text{Capitalization} = \frac{\text{Estimated Earnings}}{\text{Fair Rate of Return}} \times 100$$

$$\text{Capitalization} = \frac{14{,}25{,}000}{19} \times 100 = \text{Rs.}\,75{,}00{,}000$$

Firm will raise Rs. 25,00,000 by equity, 10,00,000 by preference shares, 20,00,000 by debentures, and Rs. 20,00,000 by long-term loan.

$$\text{Kd} = \frac{I_1 + \frac{MV - NP}{N}}{\frac{MV + NP}{2}} \times (1 - t)$$

$$\text{Kd} = \frac{9 + \frac{100 - 96}{5}}{\frac{100 + 96}{2}} \times (1 - 0.40) = 0.06 \text{ or } 6\%$$

$$K_L = \frac{I_1}{NP} \times (1 - t)$$

$$K_L = \frac{1,70,000}{20,00,000 - 30,000} \times (1 - 0.40) = 0.05177 \text{ or } 5.18\%$$

$$Kp = \frac{D_1 + \frac{MV - NP}{N}}{\frac{MV + NP}{2}}$$

$$Kp = \frac{10 + \frac{103 - 97}{5}}{\frac{103 + 97}{2}} = 0.112 \text{ or } 11.2\%$$

Calculation of Equity Earning

Particulars	Amount (Rs.)
EBIT	14,25,000
Less – Interest on Loan @ 8.5%	(1,70,000)
Less – Interest on Debentures @ 9%	(1,80,000)
EBT	10,75,000
Less – Tax @ 40%	(4,30,000)
EAT	6,45,000
Preference Dividend	(1,00,000)
Equity Earnings	5,45,000
Equity Dividend (70% of EE)	3,81,500
EPS	2.18
DPS	1.53

$$Ke = \frac{D_1}{NP} = \frac{1.53}{9.70} = 0.1577 \text{ or } 15.77\%$$

$$WACC = \frac{\sum W_i K_i}{\sum W_i} = \frac{72.99}{7.5} = 9.73\%$$

Calculation of WACC

Capital Component	Amount	Weight (W_i)	After Tax Cost (K_i)	$W_i K_i$
Long-term Loan	20,00,000	2	5.18	10.36
Debenture	20,00,000	2	6.00	12.00
Preference Shares	10,00,000	1	11.20	11.20
Equity Shares	25,00,000	2.5	15.77	39.43
Total	75,00,000	$\sum W_i = 7.5$		$\sum W_i K_i =$ 72.99

Illustration # 2: The capital structure of Alfa Ltd. consists of 2000 debentures (first issue) of Rs. 100 each at 6 percent coupon rate, 2000 preference shares of Rs. 100 each @ 8 percent dividend, 1000 debentures (second issue) of Rs. 100 each at @ 7 percent, 40000 equity shares of Rs. 10 each, and retained earnings Rs. 1,00,000. The shares of the company are sold in the market at book value. The earnings per share in the past many years have been Rs. 1.50. Corporate tax rate is 50 percent. Find WACC.

Solution:

$$\text{Kd (After tax)} = \text{Kd (Before tax)} \times (1 - \text{t})$$

$$\text{Kd}_{\text{AT}} \text{ (First Issue)} = 6 \times (1 - 0.50) = 3\%$$

$$\text{Kp} = 8\%$$

$$\text{Kd}_{\text{AT}} \text{ (Second Issue)} = 7 \times (1 - 0.50) = 3.5\%$$

$$\text{Ke} = \frac{\text{E}_1}{\text{P}_0} = \frac{1.50}{12.50} = 12\%$$

$$\text{BV}_{\text{PS}} = \frac{\text{Equity Capital + Reserves \& Surplus}}{\text{Number of Equity Shares}} = \frac{400000 + 100000}{40000} = \text{Rs. } 12.50$$

Calculation of WACC

Capital Component	Amount	Weight (W_i)	After Tax Cost (X_i)	$W_i K_i$
Debenture (First Issue)	2,00,000	0.20	3.00	0.60
Debenture (Second Issue)	1,00,000	0.10	3.50	0.35
Preference Shares	2,00,000	0.20	8.00	1.60
Equity Shares	4,00,000	0.40	12.00	4.80
Retained Earnings	1,00,000	0.10	12.00	1.20
Total	10,00,000	$\sum W_i =$ 1.00		WACC = $\sum W_i K_i =$ 8.55

Illustration # 3: Beta Ltd. has arranged capital from the following sources.

Capital Component	Book Value	Market Value	After Tax Cost of Capital
Debenture	4,00,000	3,80,000	5%
Preference Shares	1,00,000	1,10,000	8%
Equity Shares	6,00,000	12,00,000	13%
Retained Earnings	2,00,000		9%

You are required to calculate weighted average cost of capital using (i) book value weights, (ii) Market value weights.

Solution:

Calculation of WACC (Book Value Weights)

Capital Component	Amount	Weight (W_i)	After Tax Cost (K_i)	$W_i K_i$
Debenture	4,00,000	0.308	5.00	1.540
Preference Shares	1,00,000	0.077	8.00	0.616
Equity Shares	6,00,000	0.461	13.00	5.993
Retained Earnings	2,00,000	0.154	9.00	1.386
Total	13,00,000	$\sum W_i = 1.000$		WACC = $\sum W_i K_i = 9.535$

Calculation of WACC (Market Value Weights)

Capital Component	Amount	Weight (W_i)	After Tax Cost (K_i)	$W_i K_i$
Debenture	3,80,000	0.225	5.00	1.125
Preference Shares	1,10,000	0.065	8.00	0.520
Equity Shares	9,00,000	0.533	13.00	6.929
Retained Earnings	3,00,000	0.177	9.00	1.593
Total	16,90,000	$\sum W_i = 1.000$		WACC = $\sum W_i K_i = 10.167$

$$\text{Market Value of Equity} = \frac{\text{BV of Eq.} \times \text{MV of Equity} + \text{RE}}{\text{BV of Equity} + \text{RE}} = \frac{600{,}000 \times 1{,}200{,}000}{800{,}000} = 900{,}000$$

$$\text{Market Value of Equity} = \frac{\text{BV of RE} \times \text{MV of Equity} + \text{RE}}{\text{BV of Equity} + \text{RE}} = \frac{200{,}000 \times 1{,}200{,}000}{800{,}000} = 300{,}000$$

Illustration # 4: The capital structure of a company as on 31 March 2020 included 1 crore equity shares of Rs. 10 each, reserves and surplus of Rs. 2 crore, and 3 lakh 11 percent debentures of Rs. 100 each. The company for financial year 2019-20 declared dividend @ 20 percent. As company is a market leader with good assured future, the dividend is likely to grow @ 5 percent every year. The current market price of stocks of the company is Rs. 80. Assuming corporate tax @ 40 percent (i) Calculate WACC of the company, and (ii) Examine the effect on WACC, if company plans to raise further Rs. 5 crore by way of long term loan at 12 percent interest rate. The new borrowing is expected to influence market price of shares. The anticipated market price of shares is Rs. 65. The rate of dividend and growth however is expected to remain unchanged.

Answer:

$Kd_{AT} = Kd_{BT} \times (1 - t) = 11 \times (1 - 0.40) = 6.60\%$

$Ke = \frac{D_1}{P_0} + G = \frac{D_0(1+G)}{P_0} + G = \frac{2(1+0.05)}{80} + 0.05 = 7.63\%$

Calculation of WACC (Existing)

Capital Component	Amount (Crore Rs.)	Weight (W_i)	After Tax Cost (K_i)	W_iK_i
Debenture	3	0.200	6.60	1.32
Equity Shares	10	0.667	7.63	5.09
Reserves & Surplus	2	0.133	7.63	1.01
Total	15	$\sum W_i = 1.00$		WACC = $\sum W_iK_i$ = 7.42

$KL_{AT} = 12 \times (1 - 0.40) = 7.20\%$

$Ke = \frac{2(1+0.05)}{65} + 0.05 = 8.23\%$

Calculation of WACC (New)

Capital Component	Amount (Crore Rs.)	Weight (W_i)	After Tax Cost (K_i)	W_iK_i
Loan	5	0.25	7.20	1.80
Debenture	3	0.15	6.60	0.99
Equity Shares	10	0.50	8.23	4.12
Reserves & Surplus	2	0.10	8.23	0.82
Total	20	$\sum W_i = 1.00$		WACC = $\sum W_iK_i$ = 7.73

New debt will result in to increase in WACC from 7.42% to 7.73%.

Illustration # 5: In order to meet financial requirements for expansion program XYZ Ltd has designed following capital structure.

Capital Component	Offer	Redemption	Cost	Maturity Period
10000 Debentures (Rs. 100 each)	At par	At 8% premium	Interest Rate 8% Flotation Cost 4%	8 years
20000 Pref. Shares (Rs. 100 each)	At 3% discount	At par	Dividend Rate 10% Flotation Cost 4%	5 years
200000 Equity shares (Rs. 10 each)	At MPS		Dividend: Rs. 2; Flotation Cost: Rs. 2 per share	

The current market price of equity shares of the company is Rs. 22. Company plans to pay equity dividend of Rs. 2 per share at the end of the year. The dividend is expected to grow @ 5 percent. Corporate tax rate is 40 percent. Calculate WACC.

Solution:

$$Kd = \frac{I_1 + \frac{MV - NP}{N}}{\frac{MV + NP}{2}} \times (1 - t) = \frac{8 + \frac{108 - 96}{8}}{\frac{108 + 96}{2}} \times (1 - 0.4) = 5.59\%$$

Here: MV = (FV + Prem.) = (100 + 8) = 108; NP = Issue Price –Exp. = (100 – 4) = 96

$$Kp = \frac{D_1 + \frac{MV - NP}{N}}{\frac{MV + NP}{2}} = \frac{10 + \frac{100 - 93}{5}}{\frac{100 + 93}{2}} = 11.81\%$$

Here: NP = FV – Discount – Issue Expenses = (100 – 3 – 4) = 93

$$Ke = \frac{D_1}{NP} + G = \frac{2}{20} + 0.05 = 15\%$$

Here: Net Proceed = Issue Price – Issue Expenses, So, NP = (22 – 2) = 20

Calculation of WACC

Capital Component	Amount (Rs.)	Weight (W_i)	After Tax Cost (K_i)	$W_i K_i$
Debenture	10,00,000	0.20	5.59	1.12
Preference Share Capital	20,00,000	0.40	11.81	4.72
Equity Share Capital	20,00,000	0.40	15.00	6.00
Total	50,00,000	$\sum W_i = 1.00$		WACC = $\sum W_i K_i = 11.84$

Illustration # 6: Unique Textiles Ltd always maintains debt-equity ratio of 4:6. It is contemplating several investment alternatives requiring investment up to 20 lakh. The cost of raising debt and equity depends on size of project and thus the funds requirements. The details are:

If project cost is limited to Rs. 2 lakh : Expected $K_d = 10\%$; and $K_e = 12\%$
If project cost is > Rs. 2 lakh, but ≤ Rs. 5 lakh : Expected $K_d = 11\%$; and $K_e = 13\%$
If project cost is > Rs. 5 lakh, but ≤ Rs. 10 lakh : Expected $K_d = 12\%$; and $K_e = 14\%$
If project cost is > Rs. 10 lakh, but ≤ Rs. 20 lakh : Expected $K_d = 13\%$, and $K_e = 15\%$

You are required to (i) Calculate composite cost of capital of two alternative projects requiring investment of Rs. 7.5 lakh and Rs. 16 lakh. (ii) If after tax expected rate of return from the project is 10 percent, under what condition it would be acceptable? Corporate tax rate is 50%.

Solution:

$Kd_{AT} = Kd_{BT} \times (1 - t)$

So, Kd_{AT} in different alternatives will be 5%, 5.5%, 6%, and 6.5%

Calculation of cost of Capital

	Investment	Source	Weight (W_i)	After Tax Cost (K_i)	$W_i K_i$	WACC ($\sum W_i K_i$)
I	≤ Rs. 2 lakh	Debt	0.4	5.0	2.0	
		Equity	0.6	12.0	7.2	9.2
II	> Rs. 2 lakh ≤ Rs. 5 lakh	Debt	0.4	5.5	2.2	
		Equity	0.6	13.0	7.8	10.0
III	> Rs. 5 lakh ≤ Rs. 10 lakh	Debt	0.4	6.0	2.4	
		Equity	0.6	14.0	8.4	10.8
IV	> Rs. 10 lakh ≤ Rs. 20 lakh	Debt	0.4	6.5	2.6	
		Equity	0.6	15.0	9.0	11.6

The projects requiring investment of Rs. 7.5 lakh and Rs. 16 lakh fall in category III and IV, hence their composite cost of capital (WACC) is 10.8 percent and 11.6 percent respectively. The project with expected after tax rate of return of 10 percent should be accepted only if its required investment is up to Rs. 5 lakh.

Illustration # 7: The capital structure of Foxy Ltd. consists of 12% debentures, 9% preference shares and some equity shares of Rs. 100 each in the ratio of 3:2:5. The expected equity dividend is Rs. 9 per share, and expected growth rate in dividend is 5%. The shares of the company are currently traded in the market at face value.

The company, for meeting funds requirements for expansion plan, is planning to take 14% loan from development financial institution. As a result of this, the proportion of existing sources of capital would get reduced by 1/10, 1/15, and 1/6 respectively. You are required examine impact of new financing on WACC of the company given that the new loan will not affect equity share price, equity dividend and dividend growth rate. Corporate tax rate is 40 percent.

Solution:

$Kd_{AT} = Kd_{BT} \times (1 - t) = 12 \times (1 - 0.4) = 7.2\%$

$Ke = \frac{D_1}{MP} + G = \frac{9}{100} + 0.05 = 14\%$

Calculation of WACC (Existing)

Capital Component	Weight (W_i)	After Tax Cost (K_i)	$W_i K_i$
Debenture	3/10	7.2	2.16
Preference Share Capital	2/10	9.0	1.80
Equity Share Capital	5/10	14.0	7.00
Total	$\sum W_i = 1$		WACC $= \sum W_i K_i$ $= 10.96$

New Proportions:

$$\text{Debentures} = \frac{3}{10} - \frac{1}{10} = \frac{2}{10} \text{ Say } \frac{3}{15} \qquad \text{Preference Shares} = \frac{2}{10} - \frac{1}{15} = \frac{2}{15}$$

$$\text{Equity Shares} = \frac{5}{10} - \frac{1}{6} = \frac{10}{30} \text{ Say } \frac{5}{15} \qquad \text{Loan} = 1 - \left(\frac{3}{15} + \frac{2}{15} + \frac{5}{15}\right) = \frac{5}{15}$$

Cost of New Loan:

$$KL_{AT} = KL_{BT} \times (1 - t) = 14 \times (1 - 0.4) = 8.4\%$$

Calculation of WACC (New)

Capital Component	Weight (W_i)	After Tax Cost (K_i)	$W_i K_i$
Debenture	3/15	7.2	1.44
Loan	5/15	8.4	2.80
Preference Share Capital	2/15	9.0	1.20
Equity Share Capital	5/15	14.0	4.67
Total	$\sum W_i = 1$		WACC $= \sum W_i K_i$ $= 10.11$

New debt will result in to decrease in WACC from 10.96% to 10.11%.

Illustration # 8: The capital structure of Applied Systems Ltd. consists of 40,000 equity shares of Rs. 100 each, 10% preference share capital of Rs. 10,00,000, and 11% debentures of Rs. 50,00,000. The current market price of equity shares is Rs. 102. The company is expected to declare dividend of Rs. 12 per share at the end of the current year. The expected growth rate in dividend is 6 percent. Corporate tax rate is 40 percent. Find out WACC of the company. If company further raises capital by issuing 12% debentures worth Rs. 30,00,000, examine its impact on WACC. The new debt is expected to result in increase in the expected equity dividend to Rs. 14 per share, fall in market price of shares to Rs. 98 and fall in dividend growth rate to 5 percent.

Solution:

$$Ke = \frac{D_1}{NP} + G = \frac{12}{102} + 0.06 = 17.76\%$$

$Kd_{AT} = Kd_{BT} \times (1 - t) = 11 \times (1 - 0.4) = 6.6\%$

Calculation of WACC

Capital Component	Amount (Rs.)	Weight (W_i)	After Tax Cost (K_i)	$W_i K_i$
Debenture	50,00,000	0.50	6.60	3.30
Preference Share Capital	10,00,000	0.10	10.00	1.00
Equity Share Capital	40,00,000	0.40	17.76	7.11
Total	1,00,00,000	$\sum W_i = 1.00$		WACC = $\sum W_i K_i = 11.41$

$Kd_{AT}(New) = Kd_{BT} \times (1 - t) = 12 \times (1 - 0.4) = 7.2\%$

$Ke(New) = \frac{D_1}{NP} + G = \frac{14}{98} + 0.05 = 19.29\%$

Calculation of WACC

Capital Component	Amount (Rs.)	Weight (W_i)	After Tax Cost (K_i)	$W_i K_i$
Debenture (Old)	50,00,000	5	6.60	33.00
Debenture (New)	30,00,000	3	7.20	21.60
Preference Share Capital	10,00,000	1	10.00	10.00
Equity Share Capital	40,00,000	4	19.29	77.16
Total	1,30,00,000	$\sum W_i = 13$		$\sum W_i K_i = 141.76$

$WACC = \frac{\sum W_i K_i}{\sum W_i} = \frac{141.76}{13} = 10.90\%$

New debt will result in to decrease in WACC from 11.41% to 10.90%.

Practical Problems on Point of Indifference

Illustration # 1: The operating income of Watson Ltd. is Rs. 1,86,000. It has 14% debentures of Rs. 5,00,000; 15% preference shares of Rs. 1,00,000 and equity shares (Rs. 100 each) of Rs. 4,00,000. Tax rate applicable to the company is 50%. Determine (i) EPS of the firm, (ii) Degree of financial leverage at present level of EBIT, and (iii) Percent change in EPS and new EPS associated with 30% change (both increase and decrease) in EBIT.

Solution:

Calculation of EPS

	Amount (Rs.)
EBIT	1,86,000
Less: Interest (@ 14%)	70,000
EBT	1,16,000
Less: Tax (@ 50%)	58,000
EAT	58,000
Less: Preference Dividend (@ 15%)	15,000
Equity Earnings	43,000
EPS = (EE/ No. of Equity Shares)	10,75

Calculation of Degree of Financial Leverage

$$\text{DFL} = \frac{\text{EBIT}}{\text{EBT} - \frac{\text{Pref. Div.}}{\text{Tax Rate}}} = \frac{1{,}86{,}000}{1{,}16{,}000 - \frac{15{,}000}{0.50}} = 2.163$$

Calculation of % Change in EPS

$$\text{DFL} = \frac{\Delta\text{EPS}}{\Delta\text{EBIT}}$$

$$2.163 = \frac{\Delta\text{EPS}}{30} = 64.9\% \text{ approx.}$$

Calculation of New EPS

	30% Increase Amount (Rs.)	30% Decrease Amount (Rs.)
EBIT	2,41,800	1,30,200
Less: Interest	70,000	70,000
EBT	1,71,800	60,200
Less: Tax (@ 50%)	85,900	30,100
EAT	85,900	30,100
Less: Preference Dividend	15,000	15,000
Equity Earnings	70,900	15,100
EPS = (EE/ No. of Equity Shares)	17.73	3.78

Illustration # 2: The capital structure of Zebra Ltd. consists of 12% debentures (Rs. 100 each) of Rs. 10 lakh, equity shares (Rs. 10 each) of Rs. 12 lakh, and reserves of Rs. 8 lakh. Its current EBIT is Rs. 4,50,000 and price – earnings ratio is 18. The company falls in the tax bracket of 40 percent.

The company is planning to introduce expansion program requiring investment of Rs. 10 lakh. The new investment is expected to generate additional sales of Rs. 15 lakh with anticipated operating profits of 12%. The expansion program can be financed either by 13% term loan or by new equity shares which can be issued at Rs. 20 per share. If company will opt debt financing the PE ratio is expected to increase to 20, and in case of equity financing, it is expected to remain same.

You are required to suggest whether company should go for expansion program? If yes, which financing plan you consider better?

Solution:

Calculation of EPS

	Existing Level (Rs.)	After Expansion (Rs.)	
		13% Debt Financing	Equity Financing
Existing EBIT	4,50,000	4,50,000	4,50,000
Add: Anticipated EBIT (12% on 15 Lakh)		1,80,000	1,80,000
Total EBIT	4,50,000	6,30,000	6,30,000
Less: Interest (12% on Rs. 10 Lakh)	1,20,000	1,20,000	1,20,000
Anticipated Interest (13% on Rs. 10 Lakh)		1,30,000	
EBT	3,30,000	3,80,000	5,10,000
Tax (@40%)	1,32,000	1,52,000	2,04,000
EAT	1,98,000	2,28,000	3,06,000
No. of Equity Shares (Each of Rs. 10)	1,20,000	1,20,000	1,20,000
Add: New Equity Shares (Each of Rs. 20)			50,000
Total Equity Shares	1,20,000	1,20,000	1,70,000
EPS (EAT/ No. of Equity Shares)	1.65	1.90	1.80
PE Ratio	18	20	18
Market Price of Shares (PER*EPS)	29.70	38.00	32.40

Here: No. of New Equity Shares $= \frac{\text{New Equity Capital}}{\text{MPS}} = \frac{10,00,000}{20} = 50,000$

PE Ratio $= \frac{\text{MPS}}{\text{EPS}}$

Practical Problems on EBIT-EPS Analysis

Illustration # 1: Darwin Box Ltd. has appointed you as finance manager. It wants to implement a project requiring investment of Rs. 30 lakh to be raised from the market. The alternative financing plans (with optional financing) in hand are as follows.

Plan A: Either equity capital of Rs. 30 lakh or equity capital of Rs. 15 lakh and 10% debentures of Rs. 15 lakh.

Plan B: Either equity capital of Rs. 30 lakh or equity capital of Rs. 20 lakh, and 12% preference shares of Rs. 10 lakh.

Plan C: Either equity capital of Rs. 30 lakh or equity capital of Rs. 10 lakh, 10% debentures of Rs. 10 lakh, and 12% preference shares of Rs. 10 lakh.

Assuming corporate tax @ 55% and face value of all the shares and debentures to be Rs. 100 each, calculate the indifference point and EPS for each financing plan. Also explain the plan you would accept and why?

Solution:

Calculation of Indifference Point

Plan A:

$$\frac{\text{EBIT}(1-\text{t})}{\text{N}_1} = \frac{(\text{EBIT} - \text{Intt.})(1-\text{t})}{\text{N}_2}$$

$$\frac{\text{EBIT}(1-0.55)}{30{,}000} = \frac{(\text{EBIT} - 1{,}50{,}000)(1-0.55)}{15{,}000}$$

$$\text{EBIT} = 3{,}00{,}000$$

Plan B:

$$\frac{\text{EBIT}(1-\text{t})}{\text{N}_1} = \frac{\text{EBIT}(1-\text{t}) - \text{PD}}{\text{N}_2}$$

$$\frac{\text{EBIT}(1-0.55)}{30{,}000} = \frac{\text{EBIT}(1-0.55) - 1{,}20{,}000}{20{,}000}$$

$$\text{EBIT} = 8{,}00{,}000$$

Plan C:

$$\frac{\text{EBIT}(1-\text{t})}{\text{N}_1} = \frac{(\text{EBIT} - \text{Intt.})(1-\text{t}) - \text{PD}}{\text{N}_2}$$

$$\frac{\text{EBIT}(1-0.55)}{30{,}000} = \frac{(\text{EBIT} - 1{,}00{,}000)(1-0.55) - 1{,}20{,}000}{10{,}000}$$

$$\text{EBIT} = 5{,}50{,}000$$

Verification

	Plan A		Plan B		Plan C	
	Option I	Option II	Option I	Option II	Option I	Option II
EBIT	3,00,000	3,00,000	8,00,000	8,00,000	5,50,000	5,50,000
Less: Interest		1,50,000				1,00,000
EBT	3,00,000	1,50,000	8,00,000	8,00,000	5,50,000	4,50,000
Less: Tax @ 55%	1,65,000	82,500	4,40,000	4,40,000	3,02,500	2,47,500
EAT	1,35,000	67,500	3,60,000	3,60,000	2,47,500	2,02,500
Less: Pref. Div.				1,20,000		1,20,000
Equity Earnings	1,35,000	67,500	3,60,000	2,40,000	2,47,500	82,500
No. of Eq. Shares	30,000	15,000	30,000	20,000	30,000	10,000
EPS	4.50	4.50	12.00	12.00	8.25	8.25