

Capital Structure Decision

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The background of the slide is a solid blue color. In the bottom right corner, there are several faint, concentric circles that resemble ripples on water, adding a decorative touch to the design.

Relevance of Capital Structure Decision

- Capital structure refers to the combination of debt and equity capital used by a company to finance long-term fixed assets and net working capital.
- Capital structure decision has important implications for the value of the company and its cost of capital.

Relevance of Capital Structure Decision

- The relevance of capital structure decision is that the value of a company can be maximized implying that the cost of its capital can be minimized by taking debt up to a particular level or with a specific debt-equity ratio.
- The job of a financial manager is to determine that specific debt-equity ratio for maximizing the value of shareholders equity.

Financial Leverage and Its Impact

- The financial leverage or gearing of a company is the ratio of debt to equity capital in its capital structure.
- Business risk is the riskiness of a company's assets if it uses no debt.
- Financial risk is the additional risk placed on the equity shareholders as a result of the use of debt by the company.

Financial Leverage and Its Impact

- These risks are measured by the standard deviation of return on equity (σROE).
- Total risk of equity shareholders = σROE
- Business risk = $\sigma\text{ROE}(u)$
- Financial risk = $\sigma\text{ROE} - \sigma\text{ROE}(u)$

Theories of Capital Structure

- Modigliani and Miller (MM) model
- Trade-off model

Modigliani and Miller (MM) Model

- MM model without corporate taxes (1958)
 - MM Proposition I : The Pie Model
 - MM Proposition II : The Cost of Equity and Financial Leverage
- MM model with corporate taxes (1963)
 - MM Proposition I
 - MM Proposition II

MM Model Without Corporate Taxes

MM Proposition I : The Pie Model

The market value of any firm is independent of its capital structure and is given by capitalizing its expected return at the rate appropriate to its risk class.

MM Model Without Corporate Taxes

MM Proposition I : The Pie Model

$$\begin{aligned} V(\text{lev}) &= V(\text{unlev}) \\ &= \text{EBIT} / K_0 = \text{EBIT} / K_{eu} \end{aligned}$$

MM Model Without Corporate Taxes

where

$V(\text{lev})$ = market value of a leveraged company

$V(\text{unlev})$ = market value of an unleveraged company

K_o = weighted average cost of capital (WACC) of a leveraged company

K_{eu} = cost of equity of an unleveraged company

EBIT = earnings before interest and tax

Assumptions of MM Model

- MM made the following assumptions. Some of which are plainly unrealistic.
- Capital markets are perfect. There are no transaction costs. Investors are rational and have symmetrical information. All investors have access to the same information and have identical estimates of each firm's future EBIT.
- Individual investors and firms can borrow or lend at the risk-free rate.
- All cash flows are perpetuities. There is no growth in EBIT.

MM Model Without Corporate Taxes

MM Proposition II : The Cost of Equity and Financial Leverage

- The cost of equity capital of a company is a linear function of its capital structure.
- The expected yield on a equity share is equal to the sum of the appropriate overall capitalization rate, K_o corresponding to the risk class of business and a premium due to financial risk equal to the debt equity ratio times the difference or spread between overall capitalisation rate, K_o and the cost of debt, K_d .

MM Model Without Corporate Taxes

MM Proposition II : The Cost of Equity and Financial Leverage

$$K_e = K_o + (K_o - K_d) * D/E$$

MM Model Without Corporate Taxes

where

K_o = overall capitalization rate (WACC)

K_e = cost of equity capital

K_d = cost of debt

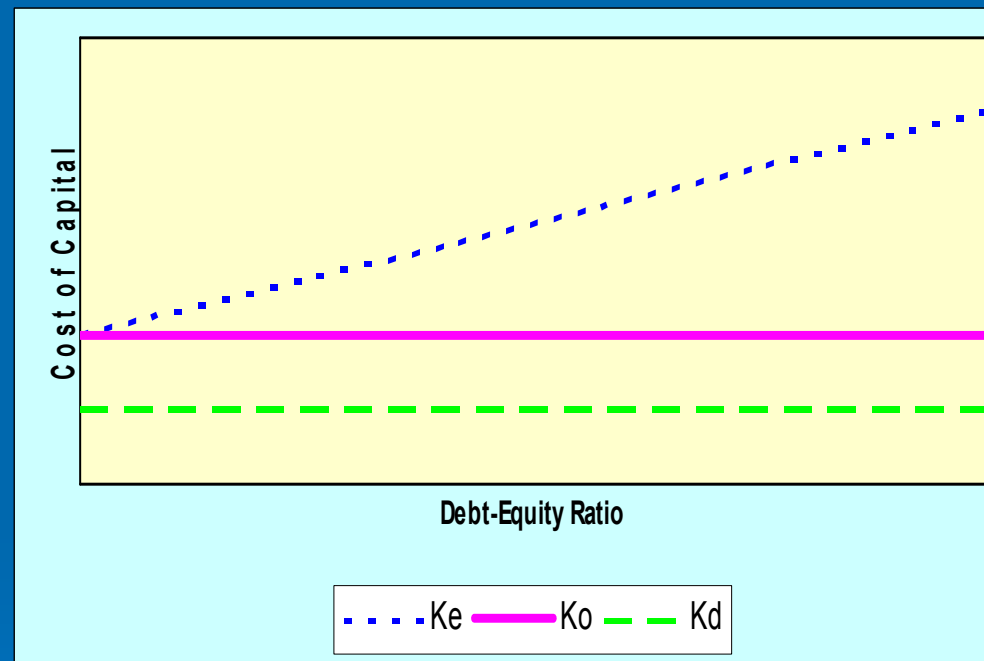
W_e = proposition of equity in total capital

W_d = proposition of debt in total capital

E = amount of equity capital

D = amount of debt capital

MM Model Without Corporate Taxes



MM Model With Corporate Taxes

Proposition I (Value of unlevered company)

The value of an unlevered company is:

$$V_u = \text{EBIT} \cdot (1-t) / K_{eu}$$

where

V_u = value of unlevered company

K_{eu} = cost of equity of unlevered company

t = corporate tax rate

MM Model With Corporate Taxes

Proposition I (Value of levered company)

- The value of a levered Company, when taxes are considered is the value of unlevered company In the same risk class plus the gain from leverage which is the present value of interest tax shield.
- The present value of interest tax shield is Obtained by capitalizing the interest tax shield using the capitalization rate equal to the cost of debt.

MM Model With Corporate Taxes

Proposition I (Value of levered company)

$$V(\text{lev}) = V_u + Dt$$

where

$V(\text{lev})$ = market value of levered company

V_u = market value of unlevered company

D = market value of debt

t = corporate tax rate

MM Model With Corporate Taxes

Proposition II (Cost of Equity of a levered company)

The cost of equity of a levered company, K_e is the sum of the cost of equity of an unlevered company in the same risk class, K_{eu} and a financial risk premium.

MM Model With Corporate Taxes

Proposition II (Cost of Equity of a levered company)

$$K_e = K_{eu} + (K_{eu} - K_d) * D/E * (1-t)$$

MM Model With Corporate Taxes

Proposition II (Cost of Equity of a levered company)

where

K_e = cost of equity of levered company

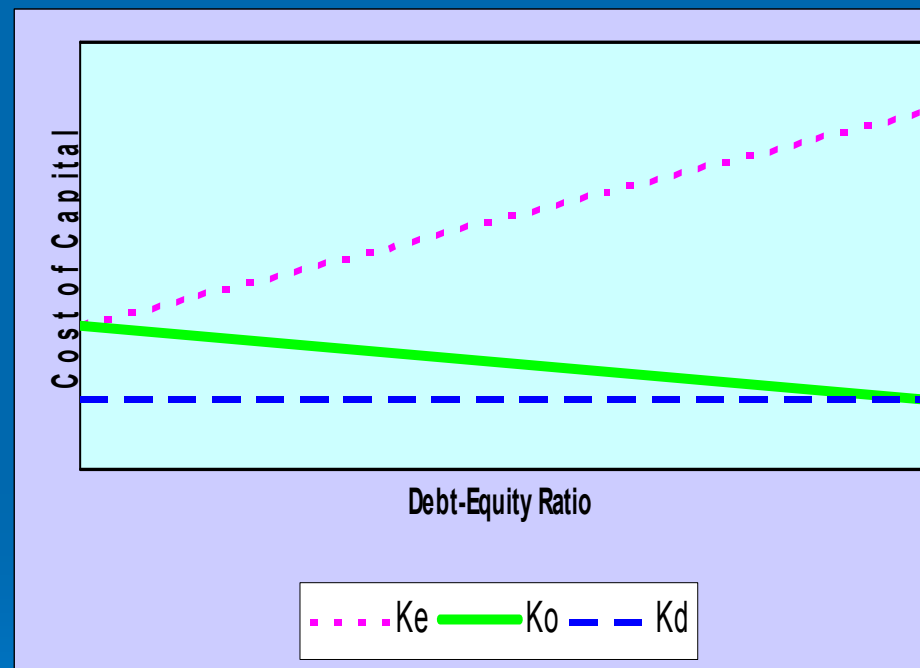
K_{eu} = cost of equity of unlevered company

K_d = cost of debt

D/E = debt equity ratio

t = corporate tax rate

MM Model With Corporate Taxes



MM Model With Corporate Taxes - Example

A company has EBIT of Rs.40 million. The company pays out all of its income as dividends. The required rate of return, K_{eu} is 15 % if no debt is used depending on the business risk faced by the company. It has debt capital of Rs.100 million with interest payable at the rate of 10 %. The corporate tax rate is 40 %. What is the WACC of the company?

MM Model With Corporate Taxes - Example

The value of unlevered company that has zero debt but pays taxes will be:

$$V_u = \text{EBIT} \cdot (1-t) / K_{eu} = 40 \cdot (1-0.4) / 0.15 \\ = \text{Rs.160 million}$$

MM Model With Corporate Taxes - Example

The value of the company with debt capital of Rs.100 million will be :

$$V(\text{lev}) = V_u + D_t$$

$$= \text{Rs.160 million} + \text{Rs.100 million} * 0.4$$

$$= \text{Rs.200 million}$$

MM Model With Corporate Taxes - Example

The value of equity capital of the company will be:

$$\begin{aligned} E &= V(\text{lev}) - D \\ &= \text{Rs.}200 \text{ million} - \text{Rs.}100 \text{ million} \\ &= \text{Rs.}100 \text{ million} \end{aligned}$$

MM Model With Corporate Taxes - Example

The cost of equity capital of the company will be:

$$\begin{aligned} K_e &= K_{eu} + (K_{eu} - K_d) * D/E * (1-t) \\ &= 0.15 + (0.15 - 0.10) * 100/100 * (1-0.4) \\ &= 18 \% \end{aligned}$$

MM Model With Corporate Taxes - Example

The weighted average cost of capital (WACC) of the company will be:

$$WACC = W_e * K_e + W_d * K_d * (1 - t)$$

$$W_e = \text{proportion of equity in total capital} \\ = 100/200 = 0.5$$

$$W_d = \text{proportion of debt in total capital} \\ = 100/200 = 0.5$$

So,

$$WACC = 0.5 * 0.18 + 0.5 * 0.10 * (1 - 0.4) = 12 \%$$

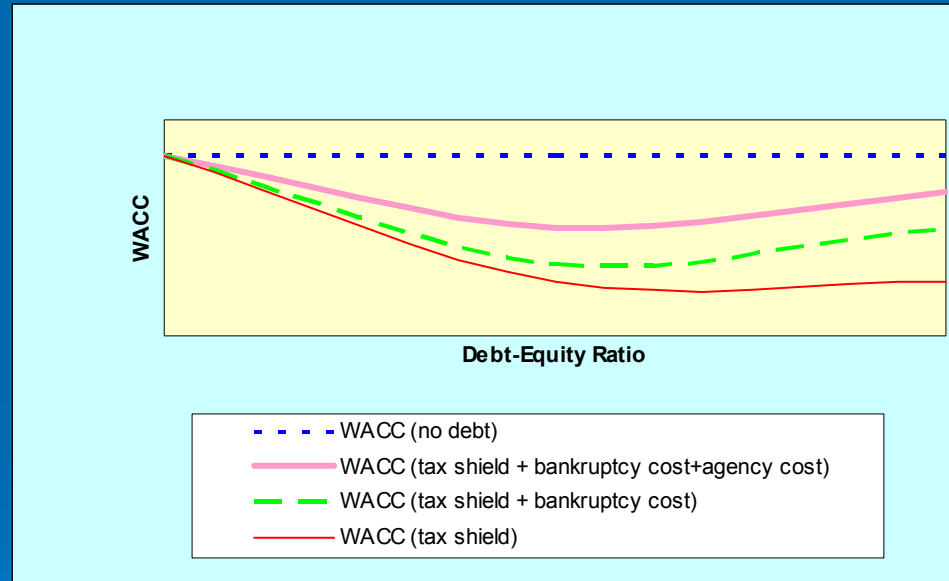
Trade-off Model

- Whenever a company takes debt in its capital structure, there are three consequences.
- First, interest paid on debt is tax deductible.
- The second consequence is that failure to pay interest and repay principal amount of debt in time can result in bankruptcy / winding up.

Trade-off Model

- The third consequence is that there is a conflict of interest between equity holders and debt holders in the operations of a company. The debt holders try to protect their interests by imposing restrictive clauses in loan agreements, which reduce the flexibility of business managers. The managers implement those restrictive clauses or protective covenants in the company as agents of debt holders. This is the agency issue and results in monitoring costs that are borne by the company. These agency costs reduce the value of the company or increase the cost of debt.

Trade-off Model – Optimal Capital Structure



Information Asymmetry and Signaling Model

Managers of a company are more informed about the prospects of their company than outside investors. This is the essence of asymmetric information.

MM model assumes symmetric information between managers and investors. This asymmetric information can influence the capital structure of a company.

Information Asymmetry and Signaling Model - Implication

A Company should raise less amount of debt than suggested by optimal capital structure based on Trade-off model. This implies that a company should reserve part of its borrowing capacity for issuing debt capital in future in the event of good investment opportunities. It is said that a company should have reserve borrowing capacity.

Pecking Order Model

The model suggests that managers prefer to use retained earnings first for financing investment. They would like to use external debt or equity only if retained earnings are not sufficient to fund investments. Again, managers prefer debt capital if external finance is required. After debt their preference is for hybrid securities like convertible bonds. Managers like to raise equity capital only as a last resort.

Pecking Order Model

According to this model, there is no well-defined target debt-equity ratio and a company's capital structure at any point of time is simply a reflection of its pecking order preferences for long-term investing.

Making Capital Structure Decision : EPIT-EPS Analysis

A company may have various financing choices to fund investment projects. One widely used method to identify the best alternative is to use EBIT-EPS analysis. Obviously, a company should use that mode of financing which maximizes the earnings per share (EPS) for equity holders.

Practical Considerations for Capital Structure

- a) Tax Consideration
- b) Reserve borrowing capacity
- c) Cash flows for servicing debt capital
- d) Agency issues
- e) Signaling to market
- f) Management control of business
- g) Financing flexibility
- h) Asset structure
- i) Credit rating of debt securities
- j) Market outlook
- k) Risk attitudes

Multiple Choice Question - 1

A Company increases amount of debt finance in its capital structure keeping total amount of capital employed the same. Capital market is perfect with no taxes. Will the company's WACC :

- a) remain the same
- b) fall
- c) rise
- d) fall to a minimum and then rise

Ans. (a)

Multiple Choice Question - 1

Ans. (a)

Multiple Choice Question - 2

As a company goes from zero debt to successively higher levels of debt, what happens to the value of the company?

- a) steadily rises
- b) steadily falls
- c) rises to a maximum and then falls
- d) remains the same

Ans. (c)

Multiple Choice Question - 2

Ans. (c)

Multiple Choice Question - 3

A Company is planning its target capital structure. It has estimated after-tax costs of debt and equity at different levels of debt as follows :

Total assets/Debt ratio	Cost of equity	Cost of debt
0	12.0 %	-
0.10	12.0 %	8.0 %
0.20	12.0 %	8.0 %
0.30	13.0 %	8.5 %
0.40	13.5 %	9.0 %
0.50	14.0 %	9.5 %
0.60	14.5 %	10.0 %

What is the target debt-equity ratio for the company?

a) 0.25, b) 0.50, c) 1.004242, d) 1.50

Multiple Choice Question - 3

Ans. (a)

Solution:

Debt to Total assets ratio

WACC

0

12.0 %

0.10

$$9 * 12 + 0.1 * 8 = 11.6 \%$$

0.20

$$8 * 12 + 0.2 * 8 = \underline{11.2} \%$$

0.30

$$7 * 13 + 0.3 * 8.5 = 11.65 \%$$

0.40

$$6 * 13.5 + 0.4 * 9.0 = 11.7 \%$$

0.50

$$5 * 14 + 0.5 * 9.5 = 11.75 \%$$

0.60

$$4 * 14.5 + 0.6 * 10.0 = 11.8 \%$$

So, target debt to total assets ratio = 0.2

And debt to equity ratio = 0.2/0.8

= 0.25

Multiple Choice Question - 4

A Company has some unused land, which, it has been recently discovered, contains huge quantity crude oil. The company needs additional funds to extract the oil. The information has been kept confidential. How should the company raise the additional capital?

- a) Issue bonds
- b) Issue equity
- c) Issue convertible bonds
- d) Issue bonds and equity in 50 : 50 ratio

Multiple Choice Question - 4

Ans. (a)

Solution: The existing shareholders will benefit the most if bonds are issued.

Multiple Choice Question - 5

A Company borrows money at 12 % but only half the interest expense is allowed as a tax deduction. The corporate tax rate is 40 %.

What is the post-tax cost of debt?

- a) 12 %
- b) 9.6 %
- c) 4.8 %
- d) 7.2 %

Multiple Choice Question - 5

Ans. (b)

Solution:

Pre-tax cost of debt for total borrowings = 12 %

Post-tax cost of debt for 50 % of borrowings

$$= 12 * (1-0.4) = 7.2 \%$$

Post tax cost of debt for the balance 50 % of the borrowings = 12 %

So, post-tax cost of debt

$$= 0.5 * 7.2 + 0.5 * 12 = 9.6 \%$$

Problem

A Company needs Rs.10 million capital for its new green field project. The net operating earnings is expected to be 30 % and the corporate tax rate is 40 %. The company expects the following alternatives for raising the capital.

- a) 100 % equity at Rs.20 per share
- b) 40 % debt at 12 % interest and 60 % equity at Rs.16 per share
- c) 30 % debt at 11 % interest, 20 % 12 % preference shares and 50 % equity at Rs.18 per share.

Which is the best alternative for the company for raising the capital?

Problem

Ans. Alternative (c)

Solution: We will undertake EBIT-EPS analysis for the three alternatives.

Problem

EBIT-EPS Analysis

(Fig. in Rs. Million)

Alternatives

	<u>(a)</u>	<u>(b)</u>	<u>(c)</u>
Value of equity	10	6	5
Value of pref. shares	-	-	2
Value of debt	-	4	3
No. of shares (million)	0.5	0.375	0.278
EBIT	3.0	3.0	3.0
Interest	-	0.48	0.33
EBT	3.0	2.52	2.67

Problem

EBT	3.0	2.52	2.67
Taxes	1.2	1.01	1.07
EAT	1.8	1.51	1.60
Preference dividend	-	-	0.24
Earnings available to Equity holders	1.8	1.51	1.36
EPS	3.60	4.03	4.89

Alternative (c) is the best since EPS is maximized in this case.