Financial Management and Management Accountancy
Paper AH 7
For B.Com (Hons) –Part III

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COST OF CAPITAL

COST OF CAPITAL-KEY CONCEPTS :

The term cost of capital refers to the minimum rate of return a firm must earn on its investments. This is in consonance with the firm's overall object of wealth maximization. Cost of capital is a complex, controversial but significant concept in financial management.

The following definitions give clarity management.

Hamption J. : The cost of capital may be defined as "the rate of return the firm requires from investment in order to increase the value of the firm in the market place".

James C. Van Horne : The cost of capital is "a cut-off rate for the allocation of capital to investments of projects. It is the rate of return on a project that will leave unchanged the market price of the stock".

Soloman Ezra : "Cost of Capital is the minimum required rate of earinings or the cut-off rate of capital expenditure".

IMPORTANCE OF COST OF CAPITAL :

The cost of capital is very important in financial management and plays a crucial role in the following areas :

i) **Capital budgeting decisions :** The cost of capital is used for discounting cash flows under Net Present Value method for investment proposals. So, it is very useful in capital budgeting decisions.

ii) **Capital structure decisions :** An optimal capital structure is that structure at which the value of the firm is maximum and cost of capital is the lowest. So, cost of capital is crucial in designing optimal capital structure.

iii) **Evaluation of financial performance :** Cost of capital is used to evaluate the financial performance of top management. The actual profitabily is compared to the expected and actual cost of capital of funds and if profit is greater than the cost of capital the performance nay be said to be satisfactory.

iv) **Other financial decisions :** Cost of capital is also useful in making such other financial decisions as dividend policy, capitalization of profits, making the rights issue, etc.

CLASSIFICATION OF COST OF CAPITAL :

Cost of capital can be classified as follows :

i) **Historical Cost and Future Cost :** Historical costs are book costs relating to the past, while future costs are estimated costs act as guide for estimation of future costs.

ii) **Specific Costs and Composite Costs :** Specific cost is the cost of a specific source of capital, while composite cost is combined cost of various sources of capital. Composite cost, also known as the weighted average cost of capital, should be considered in capital and capital budgeting decisions.

iii) **Explicit and Implicit Cost :** Explicit cost of any source of finance is the discount rate which equates the present value of cash inflows with the present value of cash outflows. It is the internal rate of return and is calculated with the following formula;

$$I_O = \frac{C_1}{(I+K)^1} + \frac{C_2}{(I+K)^2} + ... + \frac{C_n}{(I+K)^n}$$

I_o = Net cash inflow received at zero of time

C = Cash outflows in the period concerned

K = Explicit cost of capital

N = Duration of time period

Implicit cost also known as the opportunity cost is the opportunity foregone in order to take up a particular project. For example, the implicit cost of retained earings is the rate of return available to shareholders by investing the funds elsewhere.

iv) Average Cost and Marginal Cost : An average cost is the combined cost or weighted average cost of various sources of capital. Marginal cost refers to the average cost of capital of new or additional funds required by a firm. It is the marginal cost which should be taken into consideration in investment decisions.

LEARNING OBJECTIVES

1. Understand the different kinds of financing available to a company: debt financing, equity financing, and hybrid equity financing.
2. Understand the debt and equity components of the weighted average cost of capital (WACC) and explain the tax implications on debt financing and the adjustment to the WACC.
3. Calculate the weights of the components using book values or market values.
4. Explain how the WACC is used in capital budgeting models and determine the beta of a project and its implications in capital budgeting problems.
5. Select optimal project combinations for a company's portfolio of acceptable potential projects.

The Cost of Capital: A Starting Point

3 broad sources of financing available or raising capital: debt, common stock (equity), and preferred stock (hybrid equity).

Each has its own risk and return profile and therefore its own rate of return required by investors to provide funds to the firm.

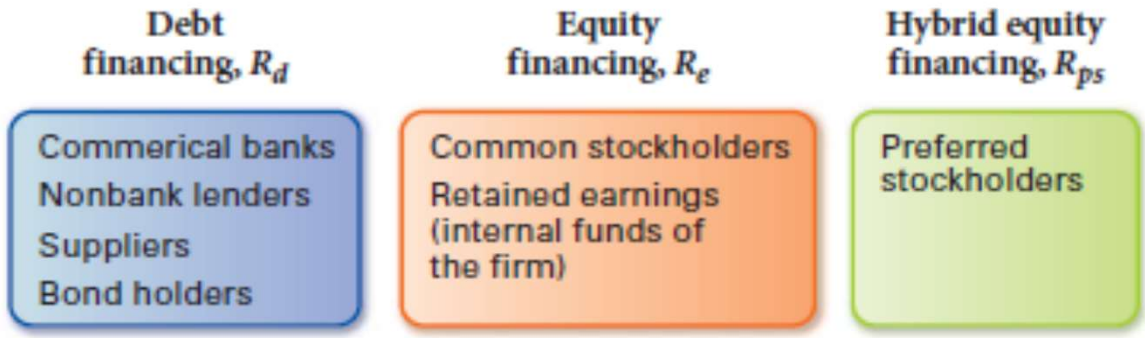


FIGURE 11.1 Component sources of capital

The Cost of Capital: A Starting Point

The weighted average cost of capital (WACC) is estimated by multiplying each component weight by the component cost and summing up the products.

The WACC is essentially the minimum acceptable rate of return that the firm should earn on its investments of average risk, in order to be profitable.

WACC is what we use as the discount rate for computing NPV and the hurdle rate with IRR:

IRR > WACC for acceptance of project.

The Cost of Capital: A Starting Point

Example: Measuring weighted average cost of a mortgage

Jim wants to refinance his home by taking out a single mortgage and paying off all the other sub-prime and prime mortgages that he took on while the going was good. Listed below are the balances and rates owed on each of his outstanding home-equity loans and mortgages:

Lender	Balance	Rate
First Thrifty Bank	Rs 150,000	7.5%
Second Consumer Bank	Rs 35,000	8.5%
Third Prime Mortgage Co.	Rs 15,000	9.5%

Below what rate would it make sense for Jim to consolidate all these loans and refinance the whole amount?

11.1 The Cost of Capital: A Starting Point

Jim's weighted average cost of borrowing

Proportion of each loan x Rate of each loan

Weighted average = (150,000/200,000)x 0.075 + (35,000/200,000) x 0.085 + (15,000/200,000) x 0.095

=(0.75 x 0.075) + (0.175 x 0.085) + (0.075 x 0.095)

= 0.05625 + 0.014875 + 0.007125 = 0.07825 or 7.825%

Jim's average cost of financing his home is 7.825%. Any rate below 7.825% would be beneficial.

Components of the Weighted Average Cost of Capital

To determine a firm's WACC we need to know how to calculate:

1. the relative weights and
2. costs of the debt, preferred stock, and common stock of a firm.

11.2 Debt Component

The *cost of debt (R_d)* is the rate that firms have to pay when they borrow money from banks, finance companies, and other lenders.

It is often measured by calculating the yield to maturity (*YTM*) on a firm's outstanding bonds, as covered in Chapter 6.

Although best solved for by using a financial calculator or spreadsheet, the *YTM* can also be figured out as follows:

$$\text{price} = \text{par value} \times \frac{1}{(1 + YTM)^n} + \text{coupon} \times \frac{1 - [1/(1 + YTM)^n]}{YTM} \quad \textbf{11.2}$$

Debt Component

YTM on outstanding bonds, indicates what investors require for lending the firm their money in current market conditions.

However, new debt would also require payment of transactions costs to investment bankers reducing the *net proceeds* to the issuer and raising the cost of debt.

Therefore, we must adjust the market price by the amount of commissions that would have to be paid when issuing new debt, and then calculate the YTM.

11.2 Debt Component

Example: Calculating the cost of debt

Kellogg's wants to raise an additional $3,000,000 of debt as part of the capital that would be needed to expand their operations into the Morning Foods sector.

- They were informed by their investment banking consultant that they would have to pay a commission of 3.5% of the selling price on new issues.
- Their CFO is in the process of estimating the corporation's cost of debt for inclusion into the WACC equation.
- The company currently has an 8%, AA-rated, non-callable bond issue outstanding, which pays interest semi-annually, will mature in 17 years, has a $1000 face value, and is currently trading at $1,075.

Calculate the appropriate cost of new debt for the firm.

Debt Component

First determine the net proceeds on each bond

= Selling price – Commission

=Rs1,075.00 - (0.035 xRs1,075.00) = $1,037.38

Using a financial calculator we enter:

P/Y = C/Y = 2

Input	34	?	-1037.38	40	1000
Key	N	I/Y	PV	PMT	FV
Output		**7.60%**			

The appropriate cost of debt for Kellogg's is 7.6%

Preferred Stock Component

Typically, preferred stock holders receive a constant dividend with no maturity point;

The cost of preferred (R_p)can be estimated by dividing the annual dividend by the net proceeds (after flotation cost) per share of preferred stock. Recall that this is the perpetuity formula from Chapter 4 and Chapter 7.

$$R_p = D_p / \textit{Net price}$$

11.2 Preferred Stock Component

Example: Cost of Preferred Stock

Kellogg's will also be issuing new preferred stock worth $1 million. They will pay a dividend of $4 per share which has a market price of $40. The flotation cost on preferred will amount to $2 per share. What is their cost of preferred stock?

ANSWER

Net price on preferred stock = $40.00 - $2.00 = $38.00;

Dividend on preferred = $4.00

Cost of preferred = R_p = $4.00 / $38.00 = 10.53%

Equity Component

The cost of equity (R_e)is essentially the rate of return that investors are demanding or expecting to make on money invested in a company's common stock.

The cost of equity can be estimated by using either the SML approach (covered in Chapter 8) or the Dividend Growth Model (covered in Chapter 7).

11.2 Equity Component

The Security Market Line Approach: calculates the cost of equity as a function of the risk-free rate (r_f) the market risk-premium [$E(r_m)-r_f$], and beta (β_i).

That is,

$$R_e = r_f + \beta_i ([E(r_m)-r_f])$$

So the cost of equity is based on current market conditions and the respective systematic risk of the company as defined by its beta.

Equity Component

Example : Calculating Cost of Equity with the SML equation

Remember Kellogg's from the earlier examples? Well, to reach their desired capital structure their CEO has decided to utilize all of their expected retained earnings in the coming quarter. Kellogg's beta is estimated at 0.65 by *Value Line.* The risk-free rate is currently 4%, and the expected return on the market is 15%. How much should the CEO put down as one estimate of the company's cost of equity?

ANSWER

$$R_e = r_f + \beta_i [E(r_m)-r_f]$$
$$R_e = 4\% + 0.65 [15\%-4\%]$$
$$R_e = 4\% + 7.15\% = 11.15\%$$

Equity Component

The Dividend Growth Approach to R_e. The Gordon Model, introduced in Chapter 7, is used to calculate the price of a constant growth stock.

However, with some algebraic manipulation it can be transformed into Equation 11.6, which calculates the cost of equity, as shown below:

$$R_e = \frac{\text{Div}_0(1 + g)}{P_0} + g \qquad \textbf{11.6}$$

where Div_0 = last paid dividend per share;

P_o = current market price per share; and

g = constant growth rate of dividend.

11.2 Equity Component

For newly issued common stock, the price must be adjusted for flotation cost (commission paid to investment banker) as shown in Equation 11.7 below:

$$R_e = \frac{\text{Div}_0(1 + g)}{P_0(1 - F)} + g \qquad 11.7$$

where F is the flotation cost in percent.

Equity Component

Example: Applying the Dividend Growth Model to calculate R_e

Kellogg's common stock is trading at Rs 45.57 and its dividends are expected to grow at a constant rate of 6%.

The company paid a dividend last year of Rs 2.27.

If the company issues stock they will have to pay a flotation cost per share equal to 5% of selling price.

Calculate Kellogg's cost of equity with and without flotation costs.

11.2 Equity Component

Cost of equity without flotation cost:

$$R_e = \frac{\text{Div}_0(1 + g)}{P_0} + g \qquad 11.6$$

R_e = (Div_0 x (1+g) / P_o) + g
= ($2.27 x (1.06)/ $45.57) + 0.06 = 11.28%

$$R_e = \frac{\text{Div}_0(1 + g)}{P_0(1 - F)} + g \qquad 11.7$$

Cost of equity with flotation cost:

R_e = [$2.27 x (1.06)/(45.57 x (1-.05)] + 0.06 = 11.56%

Equity Component

Depending on the availability of data, either of the two models, or both, can be used to estimate R_e.

With two values, the average can be used as the cost of equity.

For example, in Kellogg's case we have

(11.15% + 11.28%)/2 = 11.22% (without flotation costs)

or (11.15% + 11.56%) /2 = 11.36% (with flotation costs)

For consistency we should use flotation costs in both estimates or estimate both without flotation costs.

11.2 Retained Earnings

Retained earnings does have a cost, i.e., the opportunity cost for the shareholders not being able to invest the money themselves. Recall, a company has the option to pay out earnings to the owners via dividends or retain the earnings for future investment. Therefore, all retained earnings are an opportunity cost for the owners.

The cost of retained earnings can be calculated by using either of the above two equity cost approaches, without including flotation cost.

11.2 The Debt Component and Taxes

Since interest expenses are tax deductible, the cost of debt, must be adjusted for taxes, as shown below, prior to including it in the WACC calculation:

After-tax cost of debt = R_d x (1-T_c)

So if the YTM (with flotation cost) = 7.6%,

and the company's marginal tax rate is 30%,

the after-tax cost of debt= 7.6% x (1 - 0.30)

= 5.32%

Weighting the Components: Book Value or Market Value?

To calculate the WACC of a firm, each component's cost is multiplied by its proportion in the capital mix and then summed up.

There are two ways to determine the proportion or weights of each capital component:

1. book value, or
2. market values.

11.3 Book Value

Book value weights can be determined by taking the balance sheet values for debt, preferred stock, and common stock, adding them up, and dividing each by the total.

These weights, however, do not indicate the current proportion of each component. Why?

1. These financing vehicles are recorded at their historical costs, not current costs.

2. The company's risk profile changes overtime and this impacts the cost of borrowing

Market Value

Market value weights are determined by taking the current market prices of the firm's outstanding securities and multiplying them by the number outstanding to get the total current value. Then dividing each by the total market value produces the proportion or weight of each

If possible, market value weights should be used since they are a better representation of a company's current capital structure and risk, which would be relevant for raising new capital.

Market Value

Example: Calculating capital component weights
Kellogg's CFO is in the process of determining the firm's WACC and needs to figure out the weights of the various types of capital sources. Accordingly, he starts by collecting information from the balance sheet and the capital markets, and makes up the Table shown below:

Component	Balance Sheet Value	Number outstanding	Current Market Price	Market Value
Debt	$ 150,000,000	150,000	$1,075	$161,250,000
Preferred Stock	$ 45,000,000	1,500,000	$40	$ 60,000,000
Common Stock	$ 180,000,000	4,500,000	$45.57	$205,065,000

What should he do next?

Book or Market Value WACC

Calculate the total book value and total market value of the capital components and then

Divide each component's book value and market value by their respective totals.

Total Book Value = $375,000,000;

Total Market Value = $426,315,000

Book Value Weights:	Market Value Weights:
Debt = $150m/$375m= 40%;	Debt = $161.25m/$426.32m= 38%
P/ S = $45m/$375m= 12%;	P/S = $60m/$426.32= 14%
C/S = $180m/$375m= 48%;	C/S= $205.07m/$426.32m= 48%

(Rounded to nearest whole number)

He should use the market value weights as they represent a more current picture of the firm's capital structure.

Adjusted Weighted Average Cost of Capital ($WACC_{adj}$)

Equation 11.9 can be used to combine all the weights and component costs into a single average cost which can be used as the firm's

$$WACC_{adj} = \frac{E}{V} \times R_e + \frac{PS}{V} \times R_{ps} + \frac{D}{V} \times R_d \times (1 - T_c) \qquad 11.9$$

Adjusted Weighted Average Cost of Capital ($WACC_{adj}$)

Example : Calculating Adjusted WACC

Using the market value weights and the component costs determined earlier, calculate Kellogg's adjusted WACC.

Capital Component	Weight	After-tax Cost%
Debt	0.38	7.6% x (1- 0.30) = 5.32%
Preferred Stock	0.14	10.53%
Common Stock	0.48	11.36%*

**using average of SML and Div. Growth Model (with flotation cost)*

$WACC_{adj}$ = 0.48 x 11.36% + 0.14 x 10.53% + 0.38 x 5.32%

= 5.45% + 1.47% + 2.02% = 8.94%

Using the Weighted Average Cost of Capital in a Budgeting Decision

Once a firm's WACC has been determined, it can be used *either* as the discount rate to calculate the *NPV* of the project's expected cash flow or as the hurdle rate which must be exceeded by the project's *IRR.*

Table 11.1 presents the incremental cash flow of a $5 million project being considered by a firm whose WACC is 12%.

TABLE 11.1 Incremental Cash Flow of a $5 Million Project

Category	T_0	T_1	T_2	T_3
Investment	–$4,400,000			
Net working capital	–$ 600,000			$ 600,000
Operating cash flow		$2,000,000	$2,000,000	$2,000,000
Salvage				$ 40,000
Total incremental cash flow	–$5,000,000	$2,000,000	$2,000,000	$2,640,000

11.4 Using the Weighted Average Cost of Capital in a Budgeting Decision

Using a discount rate of 12%, the project's NPV would be determined as follows:

$$NPV = -CF_0 + \frac{CF_1}{(1 + WACC)^1} + \frac{CF_2}{(1 + WACC)^2} + \frac{CF_3}{(1 + WACC)^3}$$

$$= -\$5{,}000{,}000 + \frac{\$2{,}000{,}000}{(1 + 0.12)^1} + \frac{\$2{,}000{,}000}{(1 + 0.12)^2} + \frac{\$2{,}640{,}000}{(1 + 0.12)^3}$$

$$= -\$5{,}000{,}000 + \$1{,}785{,}714 + \$1{,}594{,}388 + \$1{,}879{,}100 = \$259{,}202$$

Since the NPV > 0 this would be an acceptable project.

Alternatively, the IRR could be determined using a financial calculator = 14.85%

Again, since IRR > 12%, this would be an acceptable project.

Individual Weighted Average Cost of Capital for Individual Projects

Using the WACC for evaluating projects assumes that the project is of average risk. Here average risk means that average risk of the company overall, not the average risk of in the market.

If projects have varying risk levels, using the same discount rate could lead to incorrect decisions. In addition, firms will tend to pick risky projects and reject projects with low risk.

11.4 Individual Weighted Average Cost of Capital for Individual Projects:

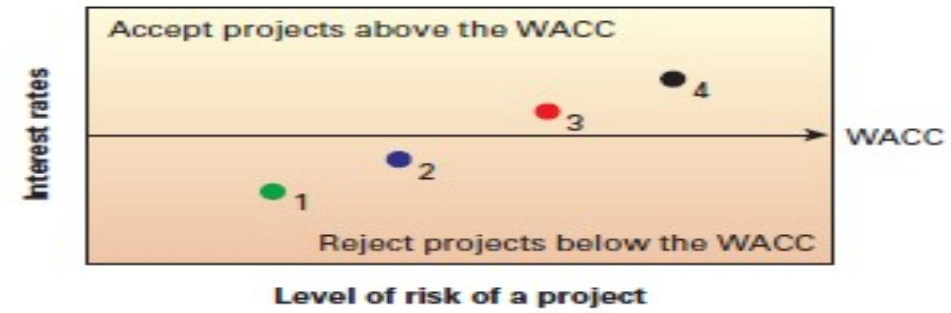


FIGURE 11.3 Capital project decision model without considering risk.

- ***4*** projects, whose *IRRs* range from 8% to 11%, but the risk levels also go from low to moderate to high to very high
- Applying a constant WACC of 9.5%, only Projects 3 and 4, with IRRs of 10% and 11% respectively would be accepted.
- However, Projects 1 and 2 could have been profitable lower risk projects that are being rejected in favor of higher risk projects, merely because the risk levels have not been adequately adjusted for prior to the decision to accept or reject.

Individual Weighted Average Cost of Capital for Individual Projects:

To adjust for risk, we would need to get individual project discount rates (WACCs) based on each project's beta.

Using a risk-free rate of 3%; a market risk premium of 9%; a before-tax cost of 10%, a tax rate of 30%; equally-weighted debt and equity levels, and varying project betas we can compute each project's hurdle rate as follows:

Project	Beta	Cost of Equity	Hurdle Rate or Adjusted WACC
1	0.6	$R_e = 3\% + 0.6\,(9\%) = 8.4\%$	$0.5 \times 8.4\% + 0.5 \times 10\% \times 0.7 = 7.7\%$
2	0.8	$R_e = 3\% + 0.8\,(9\%) = 10.2\%$	$0.5 \times 10.2\% + 0.5 \times 10\% \times 0.7 = 8.6\%$
3	1.2	$R_e = 3\% + 1.2\,(9\%) = 13.8\%$	$0.5 \times 13.8\% + 0.5 \times 10\% \times 0.7 = 10.4\%$
4	1.8	$R_e = 3\% + 1.8\,(9\%) = 19.2\%$	$0.5 \times 19.2\% + 0.5 \times 10\% \times 0.7 = 13.1\%$

Individual Weighted Average Cost of Capital for Individual Projects:

Under the risk-adjusted approach, Project 1 (IRR=8%>7.7%) and Project 2 (IRR=9%>8.6%) should be accepted, while Project 3 (IRR=10%<10.4%) and Project4 (IRR=11%<13.1%) should be rejected

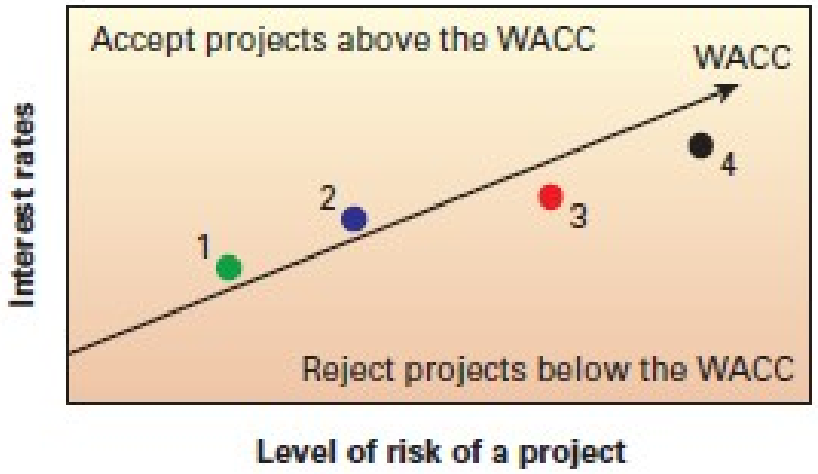


FIGURE 11.4 Capital project decision model with risk.

COMPUTATION OF COST OF CAPITAL :

Computation of cost capital of a firm involves the following steps :

i) Computation of cost of specific sources of a capital, viz., debt, preference capital, equity and retained earnings, and

ii) Computation of weighted average cost of capital.

Cost of Debt (k_d)

Debt may be perpetual or redeemable debt. Moreover, it may be issued at par,at premium or discount. The computation of cost of debt in each is explained below.

Perpetual / irredeemable debt :

K_d = Cost of debt before tax =I/P_o

K_d = Cost of debt; I= interest; P_o = net proceeds

k_d(after-tax) = $I/P(1-t)$

Where t = tax rate

Example

Y Ltd issued Rs. 2,00,000, 9% debentures at a premium of 10%. The costs of floatation are 2%. The tax rate is 50%. Compute the after tax cost of debt.

Answer : k_d (after-tax) = $\frac{I}{NP}(1-t) = \frac{\text{Rs. } 18{,}000}{\text{Rs. } 2{,}15{,}600}(1-0.5) = 4.17\%$

[net proceeds = Rs. 2,00,000 + 20,000 – (2/100×2,20,000)]

Redeemable debt

The debt repayable after a certain period is known as redeemable debt. Its cost computed by using the following formula :

i) Before – tax cost of debt = $$\frac{I + 1/n\,(P - NP)}{\frac{1}{2}(P + NP)}$$

I = interest : P = proceeds at par;

NP = net proceeds; n = No. of years in which debt is to be redeemed

ii) After tax cost of debt = Before – tax cost of debt × (1-t)

Example

A company issued Rs. 1,00,000, 10% redeemble debentures at a discount of 5%. The cost of floatation amount to Rs. 3,000. The debentures are redeemable after 5 years. Compute before – tax and after – tax cost of debt. The tax rate is 50%.

Solution :

i) Before – tax cost of debt $= \dfrac{I+1/n\ (P-NP)}{½\ (P+NP)}$

$$= \frac{10,000+1/5(1,00,000-92,000)}{½\ (1,00,000+92,000)}$$

$$= \frac{10,000+1,600}{96,000} = \frac{11,600}{96,000} = 12.08\%$$

[NP = 1,00,000 – 5,000 – 3,000 = 92,000]

After tax cost of debt = Before – tax cost x (1-t) = 12.08 X (1-.5) = 6.04%

Cost of Preference Capital (k_p)

In case of preference share dividend are payable at a fixed rate. However, the dividends are not allowed to be deducted for computation of tax. So no adjustment for tax is required. Just like debentures, preference share may be perpetual or redeemable. Further, they may be issued at par, premium or discount.

Perpetual Preference Capital

i) If issued at par ; $K_p = D/P$

K_p = Cost of preference capital

D = Annual preference dividend

P = Proceeds at par value

ii) If issued at premium or discount

$K_p = D/NP$ Where NP = net proceeds.

Example :

A company issued 10,000, 10% preference share of Rs. 10 each, Cost of issue is Rs. 2 per share. Calculate cost of capital if these shares are issued (a) at par, (b) at 10% premium, and (c) at 5% discount.

Solutions : Cost of preference capital, (K_p) = D/NP

a) When issued at par :

$$K_p = \frac{\text{Rs. } 10{,}000}{1{,}00{,}000 - 20{,}000} \times 100 = \frac{10{,}000}{80{,}000} \times 100 = 12.5\%$$

[Cost of issue = 10,000 × Rs. 2 = Rs. 20,000]

b) When issued at 10% premium :

$$K_p = \frac{\text{Rs. } 10{,}000}{1{,}00{,}000 + 10{,}000 - 20{,}000} \times 100 = \frac{10{,}000}{90{,}000} \times 100 = 11.11\%$$

c) When issued at 5% discount :

$$K_p = \frac{\text{Rs. } 10{,}000}{1{,}00{,}000 - 5{,}000 - 20{,}000} \times 100 = \frac{10{,}000}{75{,}000} \times 100 = 13.33\%$$

Redeemable preference shares - It is calculated with the following formula :

$$K_p = \frac{D + (MV - NP)/n}{\frac{1}{2}(MV + NP)}$$

Where, K_p = Cost of preference capital

D = Annual preference dividend

MV = Maturity value of preference shares

NP = Net proceeds of preference shares

n = Maturity Period

Example :

A company issues 1,00,000, 10% preference share of Rs. 10 each. Calculate the cost c preference capital if it is redeemable after 10 years and issued.

a) At par b) at 5% premium

Solution :

$$K_p = \frac{D + 1/n\,(MV - NP)}{\frac{1}{2}(MV + NP)} \times 100$$

a) Cost of preference capital, if redeemable at par :

$$K_p = \frac{\text{Rs. } 1{,}00{,}000 + 1/10\,(10{,}00{,}000 - 10{,}00{,}000)}{\frac{1}{2}(10{,}00{,}000 + 10{,}00{,}000)} \times 100 = \frac{\text{Rs. } 1{,}00{,}000}{\text{Rs. } 10{,}00{,}000} \times 100 = 10\%$$

b) If redeemable at a premium of 5%

$$K_p = \frac{\text{Rs. } 1{,}00{,}000 + 1/10\ \ (10{,}50{,}000 - 10{,}00{,}000)}{\frac{1}{2}(10{,}50{,}000 + 10{,}00{,}000)} \times 100$$

$$= \frac{\text{Rs. } 1{,}00{,}000 + 5{,}000}{\text{Rs. } 10{,}25{,}000} \times 100 = \frac{\text{Rs. } 1{,}05{,}000}{\text{Rs. } 10{,}25{,}000} \times 100 = 10.24\%$$

Cost of Equity capital

Cost of Equity is the expected rate of return by the equity shareholders. Some argue that, as there is no legal compulsion for payment, equity capital does not involve any cost. But it is not correct. Equity shareholders normally expect some dividend from the company while making investment in shares. Thus, the rate of return expected by them becomes the cost of equity. Conceptually, cost of equity share capital may be defined as the minimum rate of return that a firm must earn on the equity part of total investment in a project in order to leave unchanged the market price of such shares. For the determination of cost of equity capital it may be divided into two categories:

i) External equity or new issue of equity shares.

ii) Retained earnings.

The cost of external equity can be computed as per the following approaches :

Dividend Yield / Dividend Price Approach : According to this approach, the cost of equity will be that rate of expected dividends which will maintain the present market price of equity shares. It is calculated with the following formula :

Ke = D/NP (for new equity shares)

Or

Ke = D/MP (for existing shares)

Where,

Ke = Cost of equity

D = Expected dividend per share

NP = Net proceeds per share

MP = Market price per share

This approach rightly recognizes the importance of dividends. However, it ignores the importance of retained earnings on the market price of equity shares. This method is suitable only when the company has stable earnings and stable dividend policy over a period of time.

Example :

A company issues, 10,000 equity shares of Rs. 100 each at a premium of 10%. The company has been paying 20% dividend to equity shareholders for the past five years and expected to maintain the same in the future also. Compute cost of equity capital. Will it make any difference if the market price of equity share is Rs. 150 ?

Solution :

$$Ke = \frac{D}{NP} = \frac{Rs.20}{Rs.110} \times 100 = 18.18\%$$

If the market price per share =Rs.150

$$Ke = \frac{D}{MP} = \frac{Rs.20}{Rs.150} \times 100 = 13.33\%$$

Dividend yield plus Growth in dividend methods

According to this method, the cost of equity is determined on the basis of the expected dividend rate plus the rate of growth in dividend. This method is used when dividends are expected to grow at a constant rate.

Cost of equity is calculated as :

$$Ke = D_1 / NP + g \text{ (for new equity issue)}$$

Where,

D_1 = expected dividend per share at the end of the year. [$D_1 = D_o(1+g)$]

NP = net proceeds per share

g = growth in dividend for existing share is calculated as:

$D_1 / MP + g$

Where,

MP = market price per share.

Example :

ABC Ltd plans to issue 1,00,000 new equity share of Rs. 10 each at par. The floatation costs are expected to be 5% of the share price. The company pays a dividend of Rs. 1 per share and the growth rate in dividend is expected to be 5%. Compute the cost of new equity share. If the current market price is Rs. 15, compute the cost of existing equity share.

Solution :

Cost of new equity shares = (K_e) = D/NP +g

K_e = 1 / (10-0.5) + 0.05 = 1 / 9.5 + 0.05

= 0.01053 + 0.05

= 0.1553 or 15.53%

Cost of existing equity share: k_e = D / MP + g

K_e = 1/ Rs. 15 + 0.05 = 0.0667 or 11.67%

Earnings Yield Method - According to this approach, the cost of equity is the discount rate that capitalizes a stream of future earnings to evaluate the shareholdings. It is computed by taking earnings per share (EPS) into consideration. It is calculated as :

i) K_e = Earnings per share / Net proceeds = EPS / NP [For new share]

ii) K_e = EPS / MP [For existing equity]

Example

XYZ Ltd is planning for an expenditure of Rs. 120 lakhs for its expansion programme. Number of existing equity shares are 20 lakhs and the market value of equity shares is Rs. 60. It has net earnings of Rs. 180 lakhs.

Compute the cost of existing equity share and the cost of new equity capital assuming that new share will be issued at a price of Rs. 52 per share and the costs of new issue will be Rs. 2 per share.

Solutions :

a) Cost of existing equity = $(K_e) = \frac{EPS}{MP}$

Earnings per share (EPS) = $\frac{1,80,00,000}{20,00,000}$ = Rs. 9

K_e =9/60=0.15 or 15%

b) Cost of new equity capital (K_e) = EPS/NP=9/52-2=9/50=0.18 or 18%

Cost of Retained Earnings (K_r)

Retained earnings refer to undistributed profits of a firm. Out of the total earnings, firms generally distribute only part of them in the form of dividends and the rest will be retained within the firms. Since no dividend is required to paid on retained earnings, it is stated that 'retained earnings carry no cost'. But this approach is not appropriate. Retained earnings has the opportunity cost of dividends in alternative investment, which becomes cost of retained earnings. Hence, shareholders expect a return on retained earnings at least equity.

$$K_r = K_e = D/NP+g$$

However, while calculating cost of retained earnings, two adjustments should be made :

a) Income-tax adjustment as the shareholders are to pay some income tax out of dividends, and b) adjustment for brokerage cost as the shareholders should incur some brokerage cost while invest dividend income. Therefore, after these adjustments, cost of retained earnings is calculated as :

$$K_r = K_e (1-t)(1-b)$$

Where, K_r = cost of retained earnings
K_e = Cost of equity
t = rate of tax
b = cost of purchasing new securities or brokerage cost.

WEIGHTED AVERAGE COST OF CAPITAL :

It is the average of the costs of various sources of financing. It is also known as composite or overall or average cost of capital.

After computing the cost of individual sources of finance, the weighted average cost of capital is calculated by putting weights in the proportion of the various sources of funds to the total funds.

Weighted average cost of capital is computed by using either of the following two types of weights :

1) Market value

2) Book Value

Market value weights are sometimes preferred to the book value weights as the market value represents the true value of the investors. However, market value weights suffer from the following limitations :

i) Market value are subject to frequent fluctuations.

ii) Equity capital gets more importance, with the use of market value weights.

Moreover, book values are readily available.

Average cost of capital is computed as followings :

$$Kw = \frac{\sum x}{\sum w}$$

Where, Kw = weighted average cost of capital

X = cost of specific sources of finance

W = weights (proportions of specific sources of finance in the total)

The following steps are involved in the computation of weighted average cost of capital :

i) Multiply the cost of each sources with the corresponding weight.

ii) Add all these weighted costs so that weighted average cost of capital is obtained.

Computation of WACC

(a) The Capital Structure of All-Good Ltd is — Equity Capital Rs. 5 Lakhs; Reserves and Surplus Rs. 2 Lakhs and Debentures Rs. 3 Lakhs. The Cost of Capital before Tax are – (a) Equity – 18% and (b) Debentures – 10%. You are required to compute the Weighted Cost of Capital, assuming a tax rate of 35%.

(b) From the following information, compute WACC of Super-Good Ltd. (Assume Tax = 35%)

- Debt to Total Funds : 2:5
- Preference Capital to Equity Capital : 1:1
- Preference Dividend Rate : 15%
- Interest on Debentures : Rs. 20000 for half-year.
- EBIT at 30% of Capital Employed : Rs. 3 Lakhs
- Cost of Equity Capital is 24%.

(c) Backwork Ltd has a Debt Equity Ratio of 2:1 and a WACC of 12%. Its Debentures bear interest of 15%. Find out the cost of Equity Capital. (Assume Tax = 35%)

Solution: **(a) WACC of All Good Ltd**

Component	Amount	%	Individual Cost in %	WACC
Debentures	3,00,000	30%	K_d= Interest ×(100%- Tax Rate) =10% × (100% - 35%) = 6.5%	1.95%
Equity	5,00,000	50%	K_e = 18%	9.00%
Reserves	2,00,000	20%	K_r= K_e= 18%	3.60%
Total	10,00,000		**K_o =**	**14.55%**

Note : Reserve are taken at same rate as Equity.

(b) Super Good Ltd.

EBIT at 30% of Capital Employed = Rs. 3 Lakhs,Capital Employed = Rs. 3 Lakhs/ 30% = Rs10,00,000.

Debt to Total Funds = 2:5. Hence, Debt = $2/5^{th}$ of Rs. 10,00,000 = Rs. 4,00,000

Shareholders' Funds = balance $3/5^{th}$ of Rs. 10,00,000 = Rs. 6,00,000

Preference to Equity Capital = 1:1 (i.e. equal). The total of both = Rs. 6,00,000

So, Preference Capital = Equity Capital = 1/2 of Rs. 6,00,000 = Rs. 3,00,000 each.

Interest on Debt = Rs. 20,000 × 2 = Rs. 40,000. Hence Interest Rate = Rs. 40,000 / Rs. 4,00,000 = 10%.

WACC is computed as under—

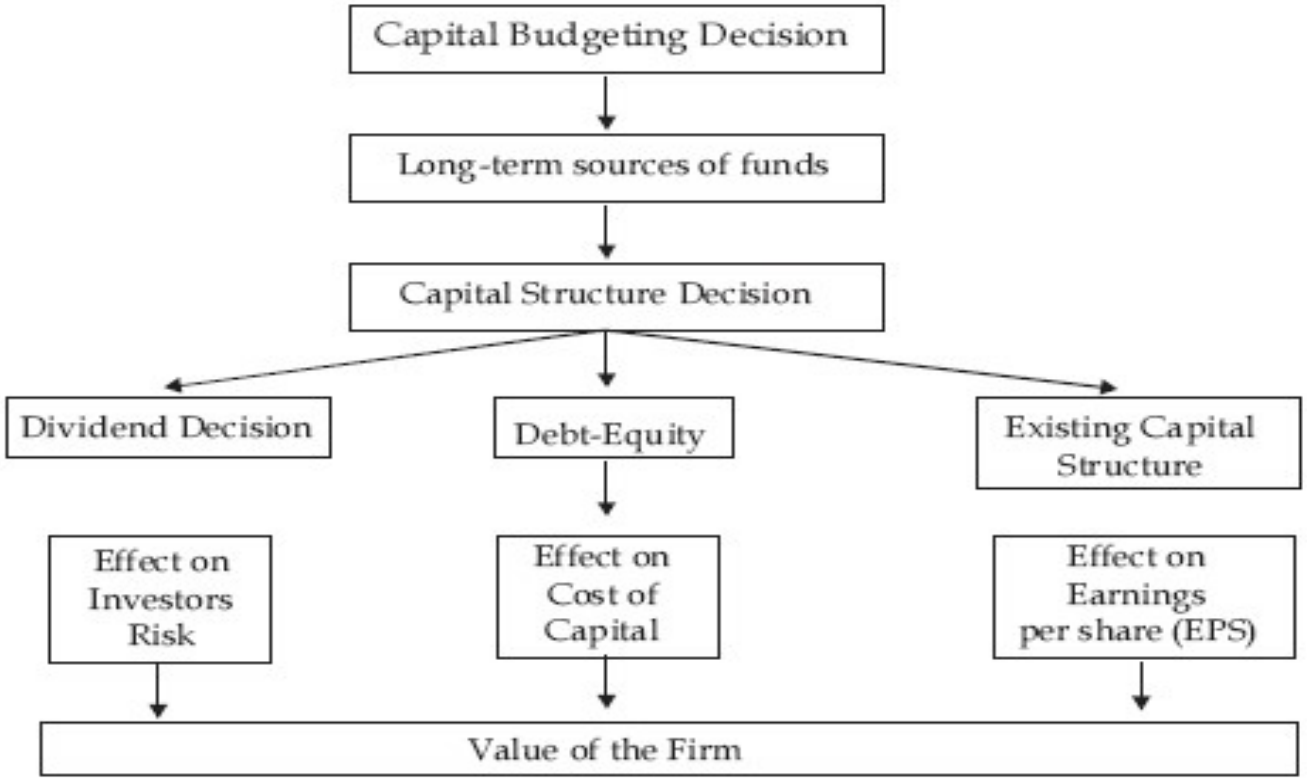
Component	Amount	%	Individual Cost in %	WACC%
Debt	4,00,000	40%	K_d = Interest × (100% - Tax Rate) =10%×(100% - 35%) = 6.5%	2.60%
Preference	3,00,000	30%	K_p = 15%	4.50%
Equity	3,00,000	30%	K_e = 24%	7.20%
Total	10,00,000		**K_o =**	**14.30%**

(c) Computation of Cost of Equity of Backwork Ltd.

Component	%	Individual Cost in %	WACC%
Debt	2/3rd	K_d = Interest × (100% - Tax Rate) =15%× (100% -35%) = 9.75%	9.75%×2/3rd=6.50%
Equity	1/3rd	K_e = 5.50 ÷ 1/3rd = **16.50%** (final balancing figure)	12%-6.5%=**5.50%** (bal. figure)
Total		**K_o =**	**(given) 12.00%**

CAPITAL STRUCTURE THEORIES

Process of Capital Structure Decisions



CAPITAL STRUCTURE THEORIES

- Net operating income (NOI) approach.
- Traditional approach and Net income (NI) approach.
- MM hypothesis with and without corporate tax.
- Miller's hypothesis with corporate and personal taxes.
- Trade-off theory: costs and benefits of leverage.

THEORIES OF CAPITAL STRUCTURE :

Equity and debt capital are the two major sources of long-term funds for a firm. The theories of capital structure suggests the proportion of equity and debt in the capital structure.

Assumptions

(i) There are only two sources of funds, i.e., the equity and the debt, having a fixed interest.

(ii) The total assets of the firm are given and there would be no change in the investment decisions of the firm.

(iii) EBIT (Earnings Before Interest & Tax)/NOP (Net Operating Profits) of the firm are given and is expected to remain constant.

(iv) Retention Ratio is NIL, i.e., total profits are distributed as dividends. [100% dividend pay-out ratio]

(v) The firm has a given business risk which is not affected by the financing decision.

(vi) There is no corporate or personal taxes.

(vii) The investors have the same subjective probability distribtuion of expected operating profits of the firm.

(viii) The capital structure can be altered without incurring transaction costs.

In discussing the theories of capital structure, we will consider the following notations :

E = Market value of the Equity

D = Maket value of the Debt

V = Market value of the Firm = E +D

I = Total Interest Payments

T = Tax Rate

EBIT/NOP = Earnings Before Interest and Tax/Net Operating Profit

PAT = Profit After Tax

D_0 = Dividend at time 0 (i.e. now)

D_1 = Expected dividend at the end of Year 1.

P_o = Current Market Price per share

P_1 = Expected Market Price per share at the end of Year 1.

K_d = Cost of Debt after Tax $\left[\frac{I(1-T)}{D}\right]$

K_e = Cost of Equity $\left[D_1/P_0\right]$

K_0 = Overall cost of capital i.e., WACC

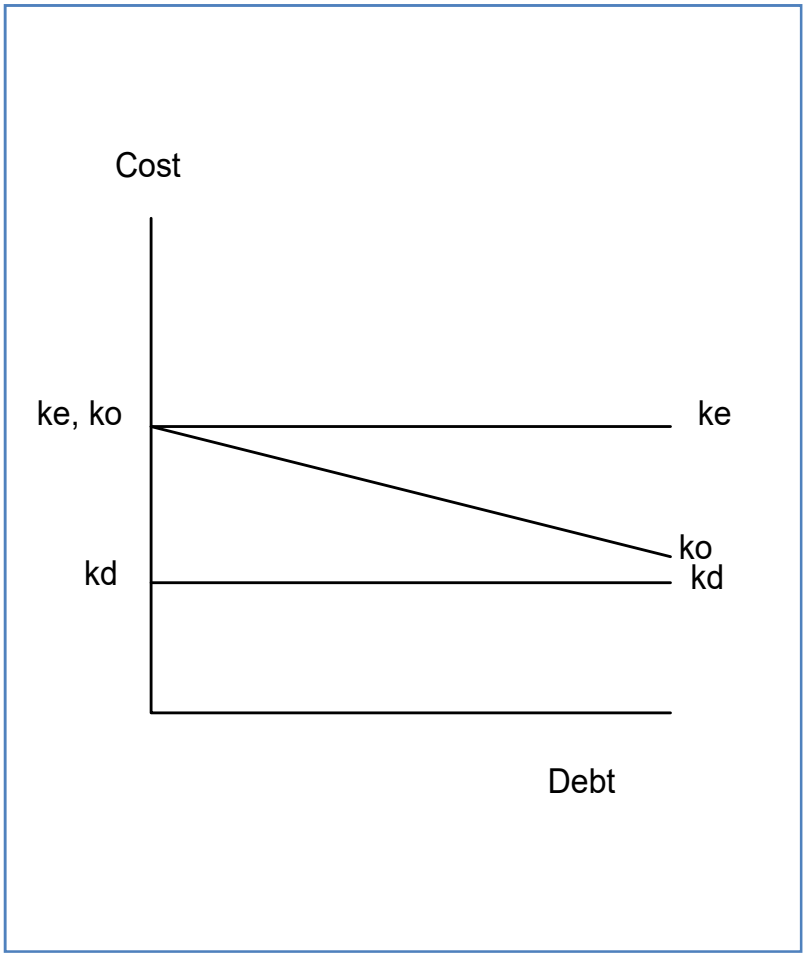
$$= K_d\left(\frac{D}{D+E}\right)+K_e\left(\frac{E}{D+E}\right)$$

$$= K_d\left(\frac{D}{V}\right)+K_e\left(\frac{E}{V}\right)=\frac{K_dD}{V}+\frac{K_eE}{V}=\frac{K_dD+K_eE}{V}$$

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

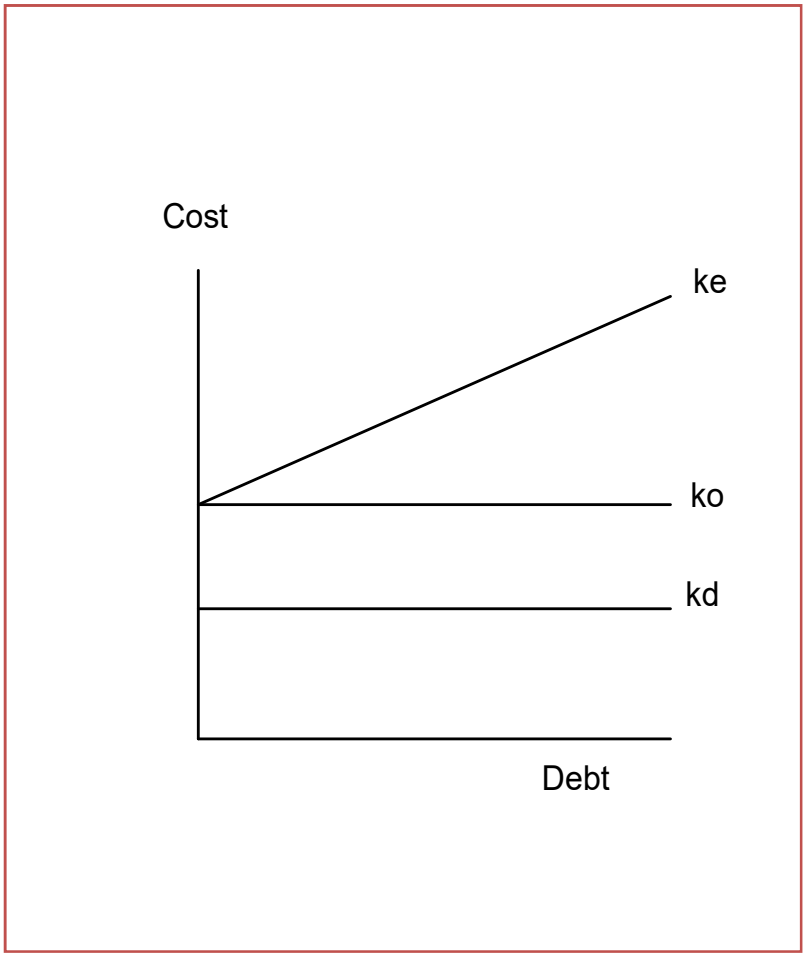
Net Income (NI) Approach

- **According to NI approach both the cost of debt and the cost of equity are independent of the capital structure; they remain constant regardless of how much debt the firm uses. As a result, the overall cost of capital declines and the firm value increases with debt. This approach has no basis in reality; the optimum capital structure would be 100 per cent debt financing under NI approach.**



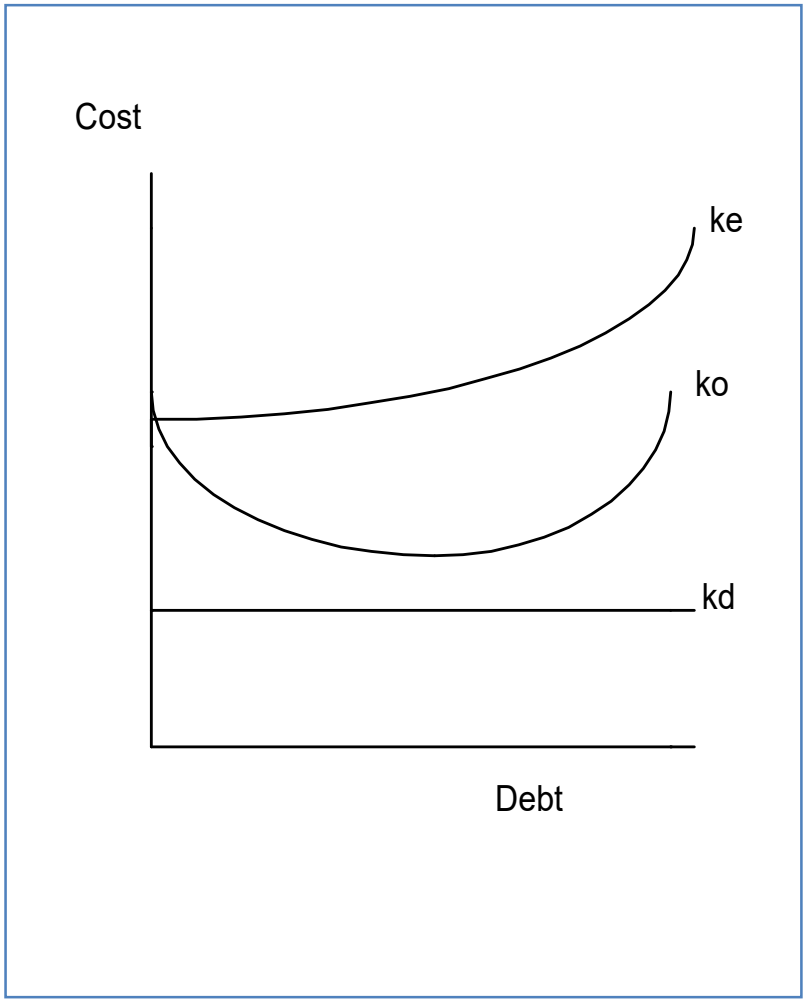
Net Operating Income (NOI) Approach

- **According to NOI approach the value of the firm and the weighted average cost of capital are independent of the firm's capital structure. In the absence of taxes, an individual holding all the debt and equity securities will receive the same cash flows regardless of the capital structure and therefore, value of the company is the same.**



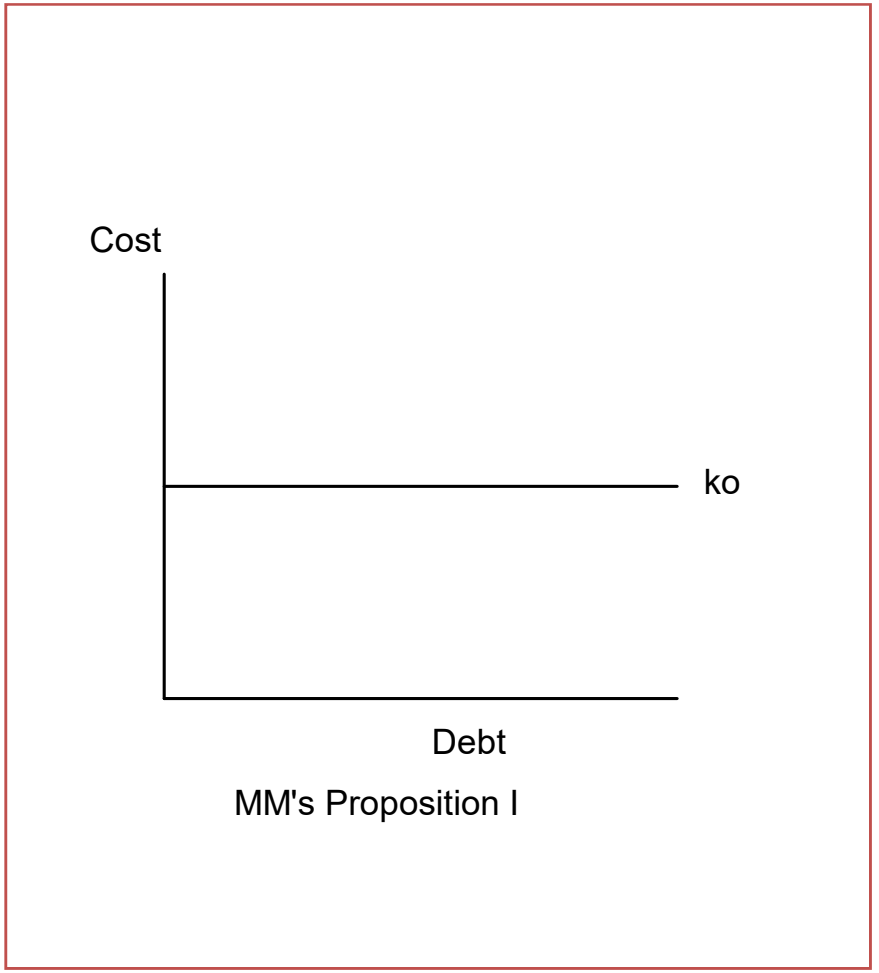
Traditional Approach

- **The traditional approach argues that moderate degree of debt can lower the firm's overall cost of capital and thereby, increase the firm value. The initial increase in the cost of equity is more than offset by the lower cost of debt. But as debt increases, shareholders perceive higher risk and the cost of equity rises until a point is reached at which the advantage of lower cost of debt is more than offset by more expensive equity.**



MM Approach Without Tax: Proposition I

- **MM's Proposition I states that the firm's value is independent of its capital structure. With personal leverage, shareholders can receive exactly the same return, with the same risk, from a levered firm and an unlevered firm. Thus, they will sell shares of the over-priced firm and buy shares of the under-priced firm until the two values equate. This is called *arbitrage.***



Arbitrage

Levered Firm (L):

$V_l = S_l + D_l = 60,000 + 50,000 = 110,000$

$k_d = \text{interest rate} = 6\%;\ \text{NOI} = \overline{X} = 10,000$

$\alpha_l = \text{shares held by an investor in } L = 10\%$

Unlevered Firm (U):

$V_u = S_u = 100,000$

$\text{NOI} = \overline{X} = 10,000$

Arbitrage

Return from Levered Firm:

$$Investment = 10\%\left(110,000 - 50,000\right) = 10\%\left(60,000\right) = 6,000$$

$$Return = 10\%\left[10,000 - \left(6\% \times 50,000\right)\right] = 1,000 - 300 = 700$$

Alternate Strategy:

1. Sell shares in L: $10\% \times 60{,}000 = 6{,}000$
2. Borrow (personal leverage): $10\% \times 50{,}000 = 5{,}000$
3. Buy shares in U: $10\% \times 100{,}000 = 10{,}000$

Return from Alternate Strategy:

$$Investment = 10{,}000$$

$$Return = 10\% \times 10{,}000 = 1{,}000$$

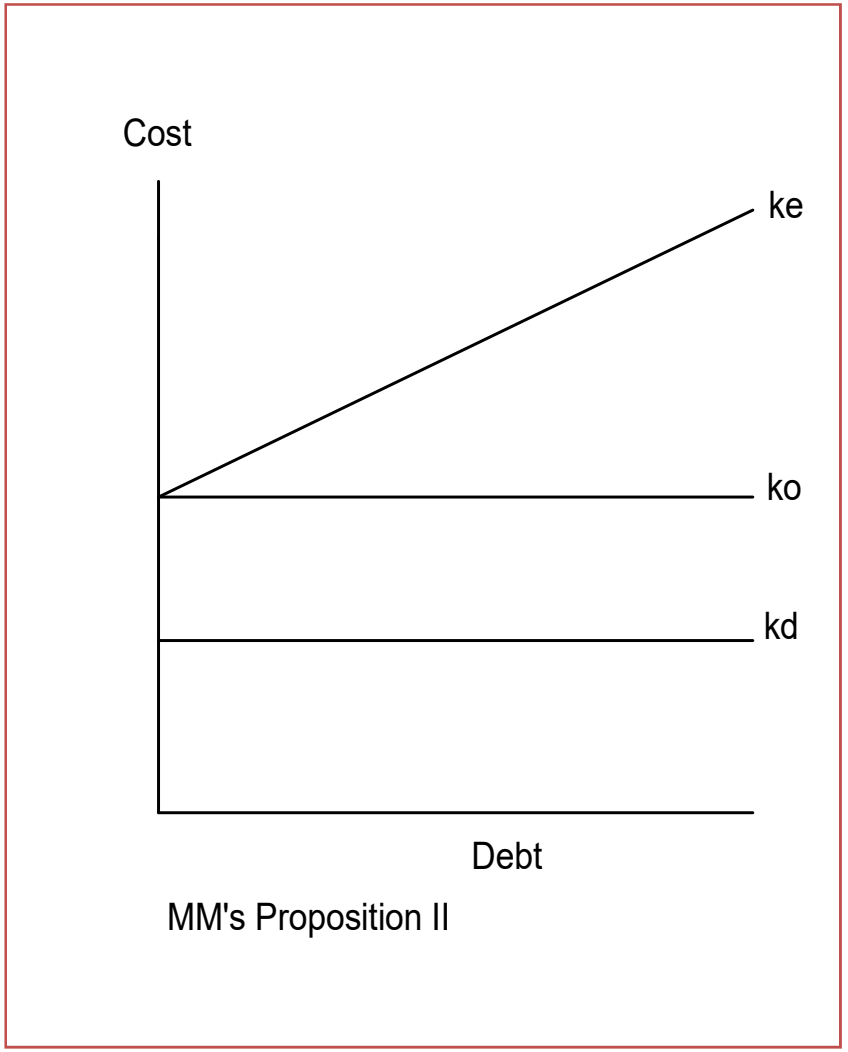
Less: Interest on personal borrowing $= 6\% \times 5{,}000 = 300$

Net return $= 1{,}000 - 300 = 700$

Cash available $= 11{,}000 - 10{,}000 = 1{,}000$

MM's Proposition II

- **The cost of equity for a levered firm equals the constant overall cost of capital plus a risk premium that equals the spread between the overall cost of capital and the cost of debt multiplied by the firm's debt-equity ratio. For financial leverage to be irrelevant, the overall cost of capital must remain constant, regardless of the amount of debt employed. This implies that the cost of equity must rise as financial risk increases.**



MM Propositions I and II

MM Proposition I :

$$V = \frac{\overline{X}}{k_o}$$

$$k_o = \frac{\overline{X}}{V}$$

MM Proposition II :

$$k_e = \frac{\overline{X} - k_d D}{S}$$

$$k_e = k_o + (k_o - k_d)D/S$$

MM Hypothesis With Corporate Tax

- **Under current laws in most countries, debt has an important advantage over equity: interest payments on debt are tax deductible, whereas dividend payments and retained earnings are not. Investors in a levered firm receive in the aggregate the unlevered cash flow plus an amount equal to the tax deduction on interest. Capitalising the first component of cash flow at the all-equity rate and the second at the cost of debt shows that the value of the levered firm is equal to the value of the unlevered firm plus the interest tax shield which is tax rate times the debt (if the shield is fully usable).**
- **It is assumed that the firm will borrow the same amount of debt in perpetuity and will always be able to use the tax shield. Also, it ignores bankruptcy and agency costs.**

LEVERAGE BENEFIT UNDER CORPOATE AND PERSONAL TAXES				
	Unlev	Lev	Unlev	Lev
Corp tax	*0%*	*0%*	*35%*	*35%*
Corp tax on div	*0%*	*0%*	*10%*	*10%*
Pers tax on div	*0%*	*0%*	*0%*	*0%*
Pers tax on int	*0%*	*0%*	*0%*	*0%*
PBIT	2500	2500	2500	2500
Int	0	700	0	700
PBT	2500	1800	2500	1800
Corp tax	0	0	875	630
PAT	2500	1800	1625	1170
Div	2500	1800	1477	1064
Div tax	0	0	148	106
Tol corp tax	0	0	1023	736
Div income	2500	1800	1477	1064
Pers tax on div	0	0	0	0
AT div income	2500	1800	1477	1064
Int income	0	700	0	700
Pers tax on int	0	0	0	0
AT int income	0	700	0	700
AT total income	2500	2500	1477	1764
Net leverage benifit		0		**287**

MM Hypothesis with Corporate Tax

After-tax earnings of Unlevered Firm:

$$\overline{X}^T = \overline{X}(1-T)$$

Value of Unlevered Firm:

$$V_u = \frac{\overline{X}(1-T)}{k_u}$$

After-tax earnings of Levered Firm:

$$\begin{aligned}\overline{X}^T &= (\overline{X} - k_d D)(1-T) + k_d D \\ &= \overline{X}(1-T) + Tk_d D\end{aligned}$$

Value of Levered Firm:

$$\begin{aligned}V_l &= \frac{\overline{X}(1-T)}{k_u} + \frac{T k_d D}{k_d} \\ &= V_u + TD\end{aligned}$$

Miller's Approach WITH Corporate and Personal Taxes

- **To establish an optimum capital structure both corporate and personal taxes paid on operating income should be minimised. The personal tax rate is difficult to determine because of the differing tax status of investors, and that capital gains are only taxed when shares are sold.**
- **Merton miller proposed that the original MM proposition I holds in a world with both corporate and personal taxes because he assumes the personal tax rate on equity income is zero. Companies will issue debt up to a point at which the tax bracket of the marginal bondholder just equals the corporate tax rate. At this point, there will be no net tax advantage to companies from issuing additional debt.**
- **It is now widely accepted that the effect of personal taxes is to lower the estimate of the interest tax shield.**

LEVERAGE BENEFIT UNDER CORPOATE AND PERSONAL TAXES										
	Unlev	Lev	Unlev	Lev	Unlev	Lev	Unlev	Lev	Unlev	Lev
Corp tax	*0%*	*0%*	*35%*	*35%*	*35%*	*35%*	*35%*	*35%*	*35%*	*35%*
Corp tax on div	*0%*	*0%*	*10%*	*10%*	*10%*	*10%*	*10%*	*10%*	*10%*	*10%*
Pers tax on div	*0%*	*0%*	*0%*	*0%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*
Pers tax on int	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*20%*	*20%*	*30%*	*30%*
PBIT	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500
Int	0	700	0	700	0	700	0	700	0	700
PBT	2500	1800	2500	1800	2500	1800	2500	1800	2500	1800
Corp tax	0	0	875	630	875	630	875	630	875	630
PAT	2500	1800	1625	1170	1625	1170	1625	1170	1625	1170
Div	2500	1800	1477	1064	1477	1064	1477	1064	1407	1064
Div tax	0	0	148	106	148	106	148	106	148	106
Tol corp tax	0	0	1023	736	1023	736	1023	736	1023	736
Div income	2500	1800	1477	1064	1477	1064	1477	1064	1407	1064
Pers tax on div	0	0	0	0	295	213	295	213	281	213
AT div income	2500	1800	1477	1064	1182	851.2	1182	851.2	1126	851.2
Int income	0	700	0	700	0	700	0	700	0	700
Pers tax on int	0	0	0	0	0	0	0	140	0	210
AT int income	0	700	0	700	0	700	0	560	0	490
AT total income	2500	2500	1477	1764	1182	1551	1182	1411	1126	1341
Net leverage benifit		0		**287**		**370**		**230**		**216**

Miller's Approach with Corporate and Personal Taxes

After-tax earnings of Unlevered Firm:

$$\overline{X}^{T} = \overline{X}(1-T)(1-T_e)$$

Value of Unlevered Firm:

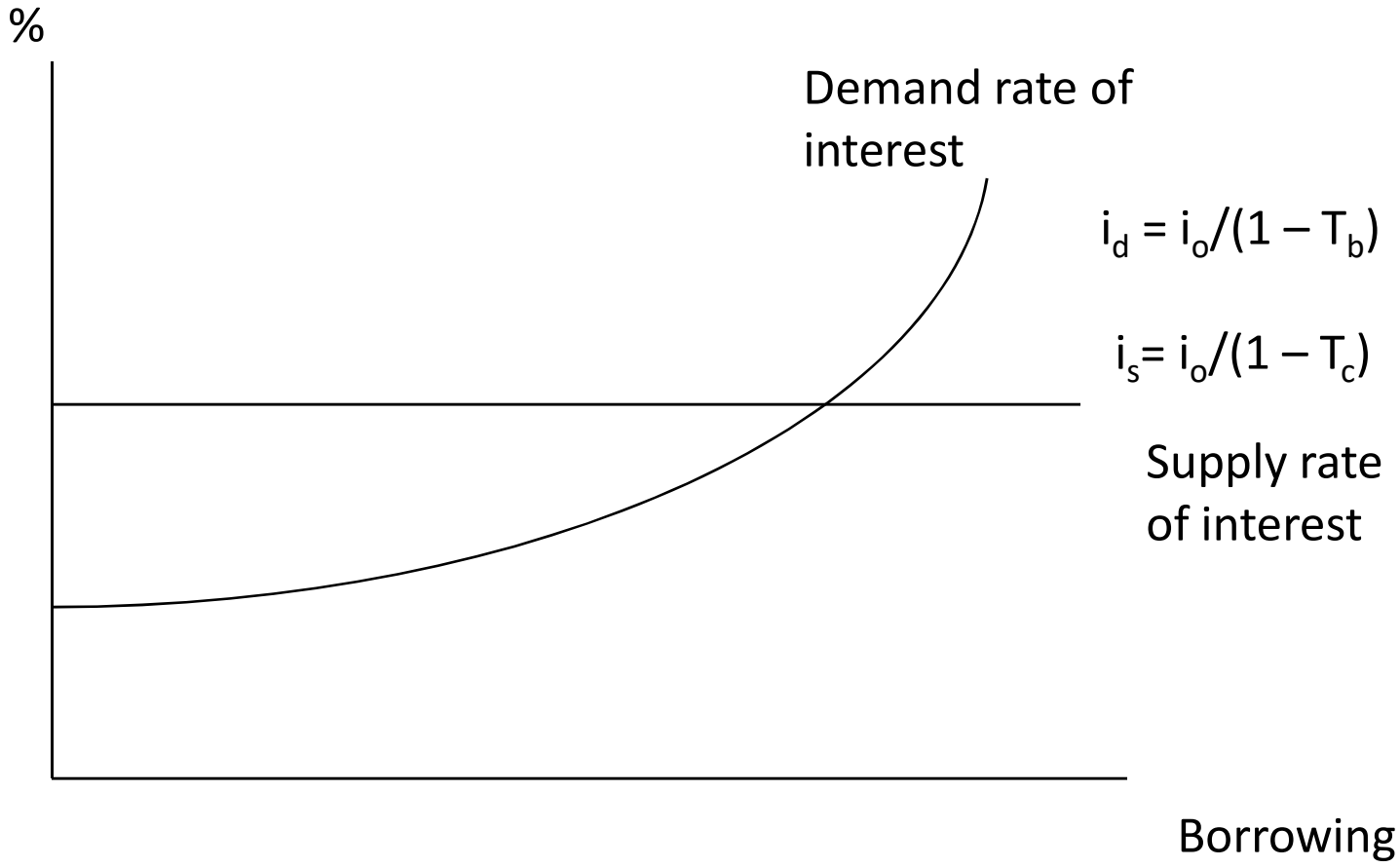
$$V_u = \frac{\overline{X}(1-T)(1-T_e)}{k_u}$$

After-tax earnings of Levered Firm:

$$\begin{aligned}\overline{X}^{T} &= (\overline{X} - k_d D)(1-T)(1-T_e) + k_d D(1-T_d) \\ &= \overline{X}(1-T)(1-T_e) + k_d D(1-T_d) - k_d D(1-T_d)(1-T_e)\end{aligned}$$

Value of Levered Firm:

$$\begin{aligned}V_l &= \frac{\overline{X}(1-T)(1-T_e)}{k_u(1-T_e)} + \frac{k_d D\left[(1-T_d) - (1-T)(1-T_e)\right]}{k_d(1-T_b)} \\ &= V_u + D\left[1 - \frac{(1-T)(1-T_e)}{(1-T_b)}\right]\end{aligned}$$


%
Demand rate of interest
$i_d = i_o/(1 - T_b)$
$i_s = i_o/(1 - T_c)$
Supply rate of interest
Borrowing

Financial Distress

- Financial distress arises when a firm is not able to meet its obligations to debt-holders.
- For a given level of debt, financial distress occurs because of the business (operating) risk . with higher business risk, the probability of financial distress becomes greater. Determinants of business risk are:
  - **Operating leverage (fixed and variable costs)**
  - **Cyclical variations**
  - **Intensity of competition**
  - **Price fluctuations**
  - **Firm size and diversification**
  - **Stages in the industry life cycle**

Consequences of Financial Distress

– **Bankruptcy costs**

Specific bankruptcy costs include legal and administrative costs along with the sale of assets at "distress" prices to meet creditor claims. Lenders build into their required interest rate the expected costs of bankruptcy which reduces the market value of equity by a corresponding amount.

– **Indirect costs**

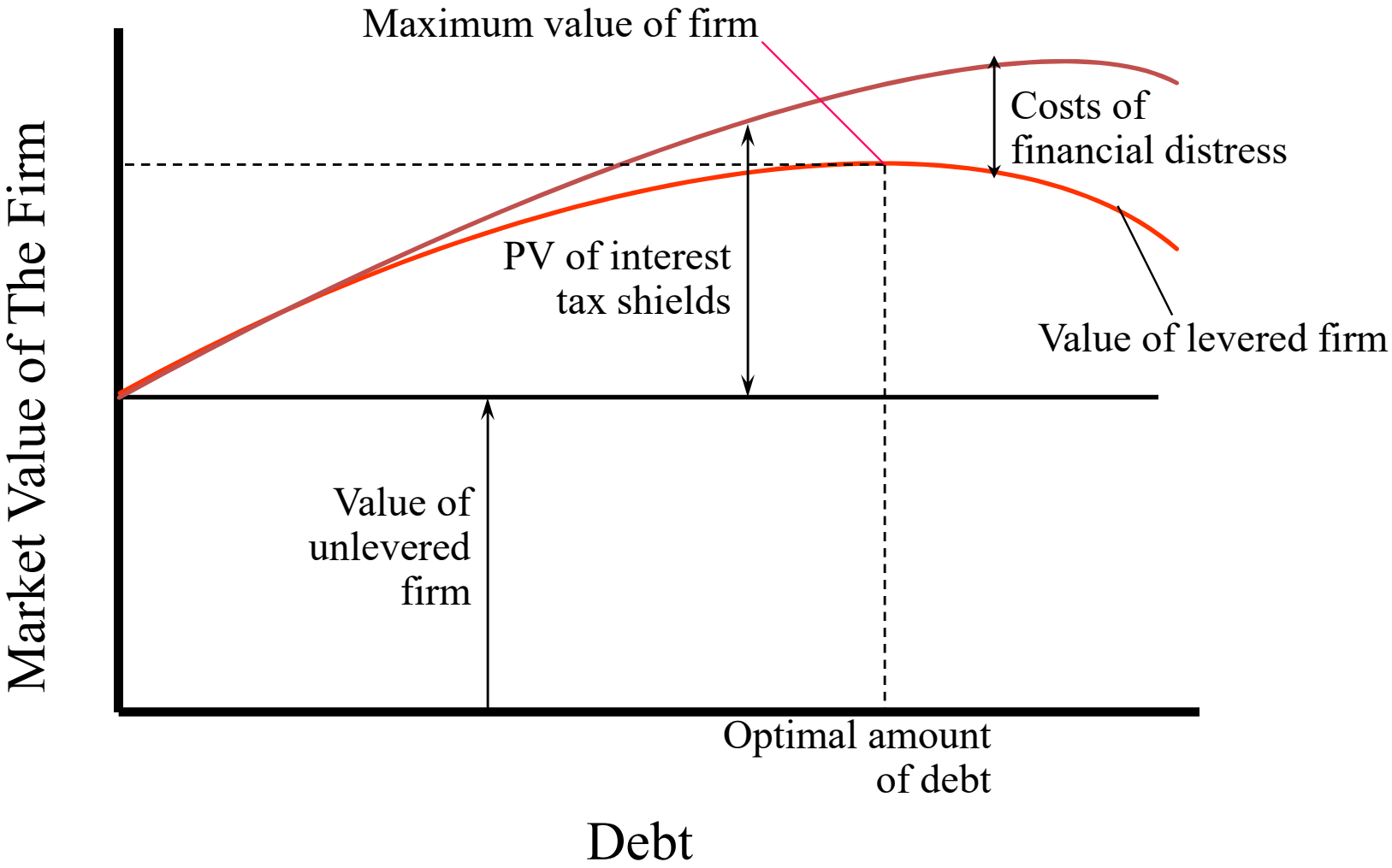
- *Investing in risky projects.*
- *Reluctance to undertake profitable projects.*
- *Premature liquidation.*
- *Short-term orientation*.

Debt Policy and Shareholders Conflicts

- **Shareholder—manager conflicts**
  - **Managers have a tendency to consume some of the firm's resources in the form of various perquisites.**
  - **Managers have a tendency to become unduly risk averse and shirk their responsibilities as they have no equity interest or when their equity interest falls. They may be passing up profitable opportunities.**
- **Shareholder—bondholder conflicts**
  - **Shareholder value is created either by increasing the value of the firm or by reducing the the value of its bonds. Increasing the risk of the firm or issuing substantial new debt are ways to redistribute wealth from bondholders to shareholders. Shareholders do not like excessive debt.**

- **Monitoring**
  - **Outside investors will discount the prices they are willing to pay for the firm's securities realising that managers may not operate in their best interests.**
  - **Firms agree for monitoring and restrictive covenants to assure the suppliers of capital that they will not operate contrary to their interests.**
- **Agency Costs**
  - **Agency costs are the costs of the monitoring and control mechanisms.**
  - **Agency costs of debt include the recognition of the possibility of wealth expropriation by shareholders.**
  - **Agency costs of equity include the incentive that management has to expand the firm beyond the point at which shareholder wealth is maximised.**

Financial Distress



Optimum Capital Structure: Trade-off Theory

- The optimum capital structure is a function of:
  - Agency costs associated with debt
  - The costs of financial distress
  - Interest tax shield
- The value of a levered firm is:

  Value of unlevered firm

  + PV of tax shield

  – PV of financial distress

Pecking Order Theory

The announcement of a share issue reduces the share price because investors believe managers are more likely to issue when shares are overpriced.

Firms prefer internal finance since funds can be raised without sending adverse signals.

If external finance is required, firms issue debt first and equity as a last resort.

The most profitable firms borrow less not because they have lower target debt ratios but because they don't need external finance.

Pecking Order Theory

Implications:

Internal equity may be better than external equity.

Financial slack is valuable.

If external capital is required, debt is better.

Features of an Appropriate Capital Structure

- ***Return***
- ***Risk***
- ***Flexibility***
- ***Capacity***
- ***Control***

Approaches to Establish Appropriate Capital Structure

- ***EBIT—EPS approach*** for analyzing the impact of debt on EPS.
- ***Valuation approach*** for determining the impact of debt on the shareholders' value.
- ***Cash flow approach*** for analyzing the firm's ability to service debt.

Cash Flow Approach to Target Capital Structure

- **Cash adequacy and solvency**
  - **In determining a firm's target capital structure, a key issue is the firm's ability to service its debt. The focus of this analysis is also on the risk of cash insolvency—the probability of running out of the cash—given a particular amount of debt in the capital structure. This analysis is based on a thorough cash flow analysis and not on rules of thumb based on various coverage ratios.**
- **Components of cash flow analysis**
  - **Operating cash flows**
  - **Non-operating cash flows**
  - **Financial cash flows**

- **Reserve financial capacity**
  - **Reduction in operating and financial flexibility is costly to firms competing in charging product and factor markets. Thus firms need to maintain reserve financial resources in the form of unused debt capacity, large quantities of liquid assets, excess lines of credit, access to a broad range of fund sources.**
- **Focus of cash flow analysis**
  - **Focus on liquidity and solvency**
  - **Identifies discretionary cash flows**
  - **Lists reserve financial flows**
  - **Goes beyond financial statement analysis**
  - **Relates debt policy to the firm value**

Cash Flow Analysis Versus EBIT–EPS Analysis

- The cash flow analysis has the following advantages over EBIT–EPS analysis:
  - It focuses on the *liquidity* and *solvency* of the firm over a long-period of time, even encompassing adverse circumstances. Thus, it evaluates the firm's ability to meet fixed obligations.
  - It goes *beyond the analysis* of profit and loss statement and also considers changes in the balance sheet items.
  - It identifies *discretionary cash flows.* The firm can thus prepare an action plan to face adverse situations.
  - It provides a list of *potential financial flows* which can be utilized under emergency.
  - It is a long-term *dynamic analysis* and does not remain confined to a single period analysis.

Practical Considerations in Determining Capital Structure

- **Control**
- ***Widely-held Companies***
- ***Closely-held Companies***
- **Flexibility**
- ***Loan Covenants***
- ***Early Repay ability***
- ***Reserve Capacity***
- **Marketability**
- ***Market Conditions***
- ***Flotation Costs***
- **Capacity of Raising Funds**
- **Agency Costs**

Net Income Approach

As suggested by David Durand, this theory states that there is a relationship between the Capital Structure and the value of the firm.

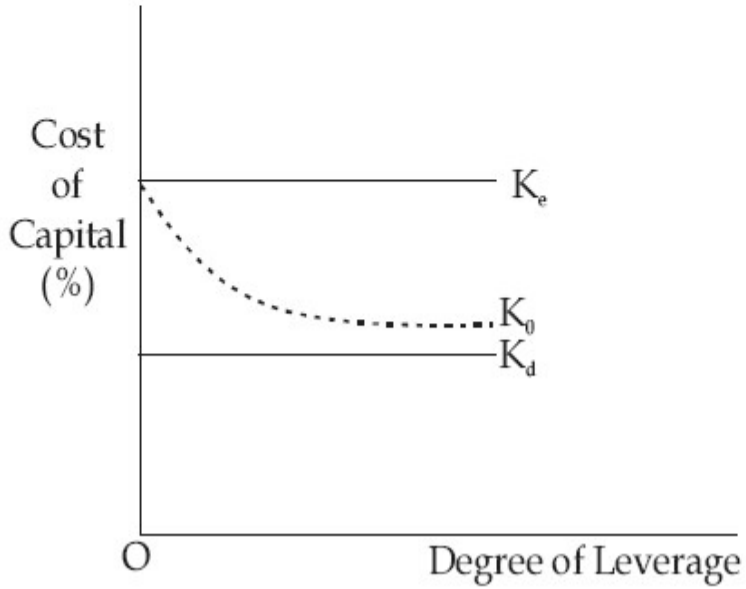
Assumptions

(1) Toal Capital requirement of the firm are given and remain constant

(2) $K_d < K_e$

(3) K_d and K_e are constant

(4) K_o decreases with the increase in leverage.



Illustration

	Firm A	Firm B
Earnings Before Interest and Tax (EBIT)	2,00,000	2,00,000
Interest (I)	—	50,000
Equity Earnings (E_e)	2,00,000	1,50,000
Cost of Equity (K_e)	12%	12%
Cost of Debt (K_d)	10%	10%
Market Value of Equity (E) = $\frac{E_e}{K_e}$	16,66,667	12,50,000
Market Value of Debt (D) = $\frac{I}{K_d}$	NIL	5,00,000
Total Value of the Firm [E+D]	16,66,667	17,50,000
Overall cost of capital (K_0) = $\frac{EBIT}{E+D}$	12%	11.43%

Net Operating Income (NOI) Approach

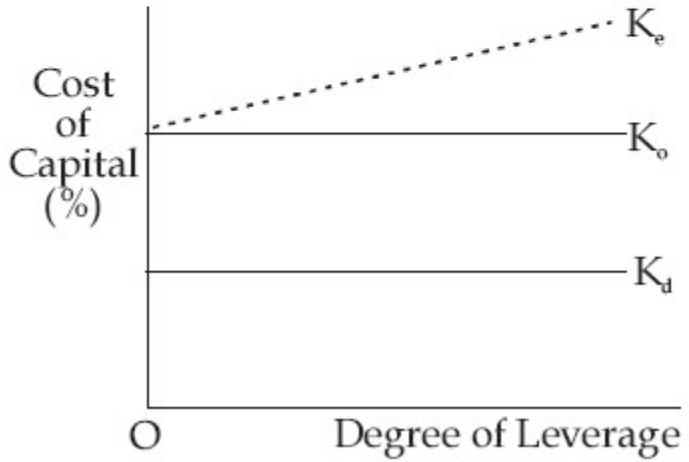
According to David Durand, under NOI approach, the total value of the firm will not be affected by the composition of capital structure.

Assumptions

(1) K_0 and K_d are constant.

(2) K_e will change with the degree of leverge.

(3) There is no tax.



Illustration

A firm has an EBIT of Rs. 5,00,000 and belongs to a risk class of 10%. What is the cost of Equity if it employs 6% debt to the extent of 30%, 40% or 50% of the total capital fund of Rs. 20,00,000 ?

Solution

	30%	**40%**	**50%**
Debt (Rs.)	6,00,000	8,00,000	10,00,000
Equity (Rs.)	14,00,000	12,00,000	10,00,000
EBIT (Rs.)	5,00,000	5,00,000	5,00,000
K_o	10%	10%	10%
Value of the Firm (V) (Rs.) (EBIT/K_o)	50,00,000	50,00,000	50,00,000
Value of Equity (E) (Rs.) (V–D)	44,00,000	42,00,000	40,00,000
Interest @ 6% (Rs.)	36,000	48,000	60,000
Net Profit (EBIT–Int.) (Rs.)	4,64,000	4,52,000	4,40,000
K_e (NP/E)	10.545%	10.76%	11%

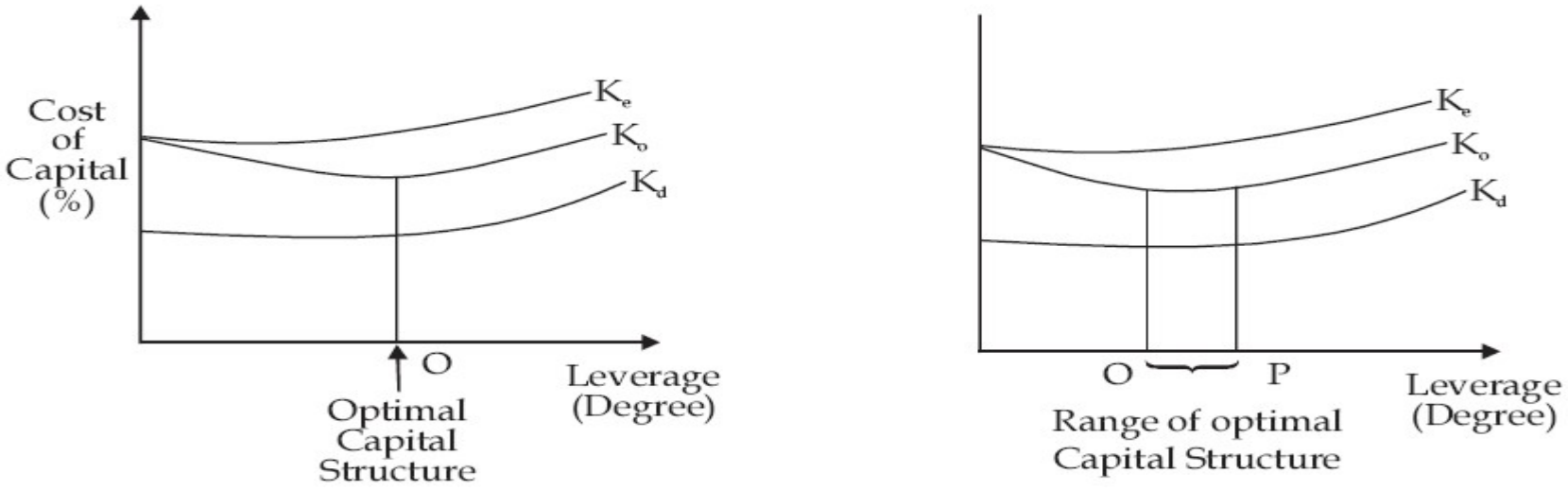
Traditional Approach :

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

Assumptions

(i) The value of the firm increases with the increase in financial leverage, upto a certain limit only.

(ii) K_d is assumed to be less than K_e.



(Part-I) **(Part-II)**

Traditional viewpoint on the Relationship between Leverage, Cost of Capital and the Value of the Firm

Modigliani – Miller (MM) Hypothesis

The Modigliani – Miller hypothesis is identical with the Net Operating Income approach. Modigliani and Miller argued that, in the absence of taxes the cost of capital and the value of the firm are not affected by the changes in capital structure. In other words, capital structure decisions are irrelevant and value of the firm is independent of debt – equity mix.

Basic Propositions

M - M Hypothesis can be explained in terms of two propositions of Modigliani and Miller. They are :

i. The overall cost of capital (K_o) and the value of the firm are independent of the capital structure. The total market value of the firm is given by capitalising the expected net operating income by the rate appropriate for that risk class.

ii. The financial risk increases with more debt content in the capital structure. As a result cost of equity (K_e) increases in a manner to offset exactly the low – cost advantage of debt. Hence, overall cost of capital remains the same.

Assumptions of the MM Approach

1. There is a perfect capital market. Capital markets are perfect when

   i) investors are free to buy and sell securities,

   ii) they can borrow funds without restriction at the same terms as the firms do,

   iii) they behave rationally,

   iv) they are well informed, and

   v) there are no transaction costs.

2. Firms can be classified into homogeneous risk classes. All the firms in the same risk class will have the same degree of financial risk.

3. All investors have the same expectation of a firm's net operating income (EBIT).

4. The dividend payout ratio is 100%, which means there are no retained earnings.

5. There are no corporate taxes. This assumption has been removed later.

Preposition I

According to M – M, for the firms in the same risk class, the total market value is independent of capital structure and is determined by capitalising net operating income by the rate appropriate to that risk class. Proposition I can be expressed as follows:

$$V = S + D = \frac{X}{K_o} = \frac{NOI}{K_o}$$

Where, V = the market value of the firm

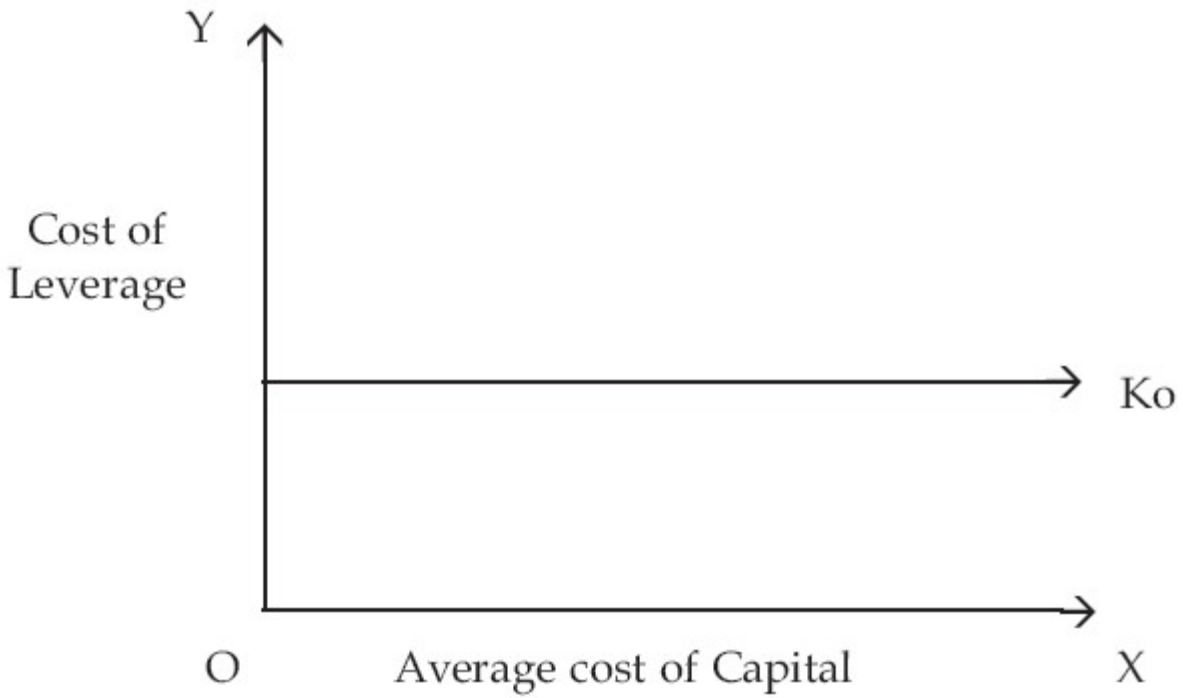
S = the market value of equity

D = the market value of debt

According the proposition I the average cost of capital is not affected by degree of leverage and is determined as follows:

$$K_o = \frac{X}{V}$$

According to M –M, the average cost of capital is constant as shown in the following Fiure.


Y
Cost of
Leverage
Ko
O
Average cost of Capital
X

Arbitrage Process

According to M –M, two firms identical in all respects except their capital structure, cannot have different market values or different cost of capital. In case, these firms have different market values, the arbitrage will take place and equilibrium in market values is restored in no time. Arbitrage process refers to switching of investment from one firm to another. When market values are different, the investors will try to take advantage of it by selling their securities with high market price and buying the securities with low market price. The use of debt by the investors is known as personal leverage or home made leverage.

Because of this arbitrage process, the market price of securities in higher valued market will come down and the market price of securities in the lower valued market will go up, and this switching process is continued until the equilibrium is established in the market values. So, M –M, argue that there is no possibility of different market values for identical firms.

Reverse Working Of Arbitrage Process

Arbitrage process also works in the reverse direction. Leverage has neither advantage nor disadvantage. If an unlevered firm (with no debt capital) has higher market value than a levered firm (with debt capital) arbitrage process works in reverse direction. Investors will try to switch their investments from unlevered firm to levered firm so that equilibrium is established in no time.

Thus, M – M proved in terms of their proposition I that the value of the firm is not affected by debt-equity mix.

Proposition II

M – M's proposition II defines cost of equity. According to them, for any firm in a given risk class, the cost of equity is equal to the constant average cost of capital ($_{Ko}$) plus a premium for the financial risk, which is equal to debt – equity ratio times the spread between average cost and cost of debt. Thus, cost of equity is:

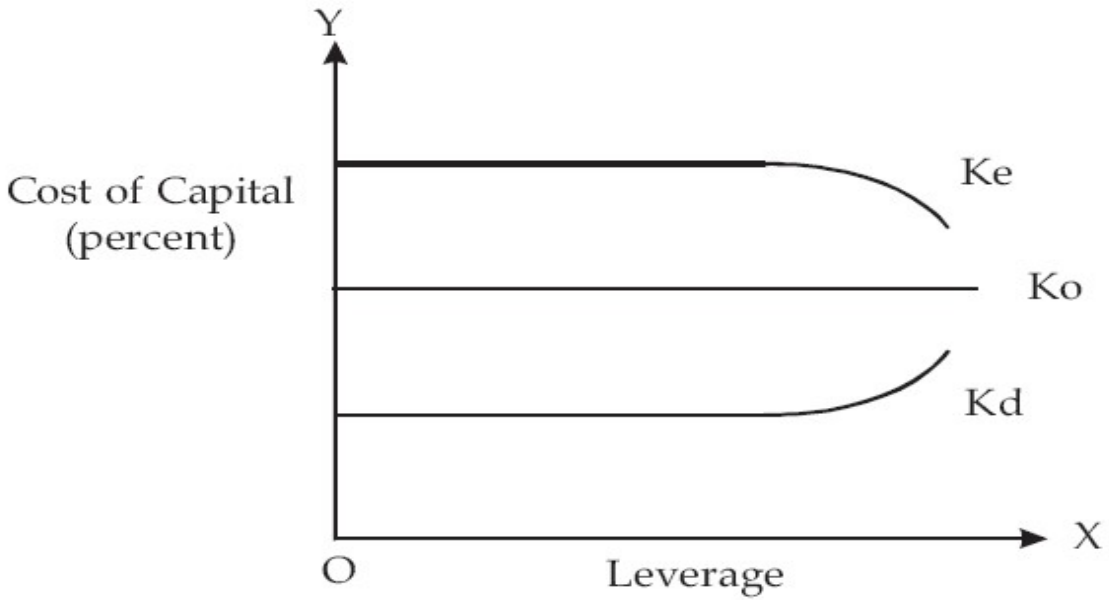
$$K_e = K_o + (K_o - K_d)\frac{D}{S}$$

Where, K_e = cost of equity

K_d = Cost of Debt

D/S = debt – equity ratio

M – M argue that K_0 will not increase with the increase in the leverage, because the low – cos advantage of debt capital will be exactly offset by the increase in the cost of equity as caused by increased risk to equity shareholders. The crucial part of the M – M Thesis is that an excessive use of leverage will increase the risk to the debt holders which results in an increas in cost of debt (K_0). However, this will not lead to a rise in K_o. M – M maintain that in such a case K_e will increase at a decreasing rate or even it may decline. This is because of the reason that at an increased leverage, the increased risk will be shared by the debt holders Hence K_o remain constant. This is illustrated in the figure given below :



M M Hypothesis and cost of capital

Criticism Of M M Hypothesis

The arbitrage process is the behavioural and operational foundation for M M Hypothesis. But this process fails the desired equilibrium because of the following limitations.

1. Rates of interest are not the same for the individuals and firms. The firms generally have a higher credit standing because of which they can borrow funds at a lower rate of interest as compared to individuals.
2. Home – Made leverage is not a perfect substitute for corporate leverage. If the firm borrows, the risk to the shareholder is limited to his shareholding in that company. But if he borrows personally, the liability will be extended to his personal property also. Hence, the assumption that personal or home – made leverage is a perfect substitute for corporate leverage is not valid.
3. The assumption that transaction costs do not exist is not valid because these costs are necessarily involved in buying and selling securities.
4. The working of arbitrage is affected by institutional restrictions, because the institutional investors are not allowed to practice home – made leverage.
5. The major limitation of M – M hypothesis is the existence of corporate taxes. Since the interest charges are tax deductible, a levered firm will have a lower cost of debt due to tax advantage when taxes exist.

M – M Hypothesis Corporate Taxes

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

According to this approach, value of a firm can be calculated as follows:

$$\text{Value of Unlevered firm (Vu)} = \frac{EBIT}{K_o}(I - t)$$

Where, EBIT = Earnings before interest and taxes

K_o = Overall cost of capital

t = Tax rate.

I = Interest on debt capital