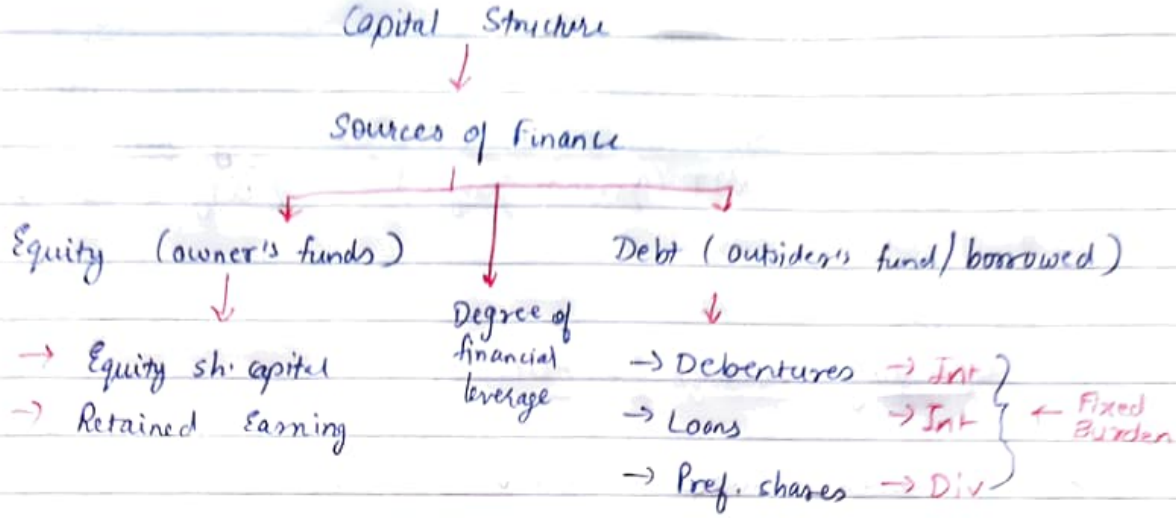
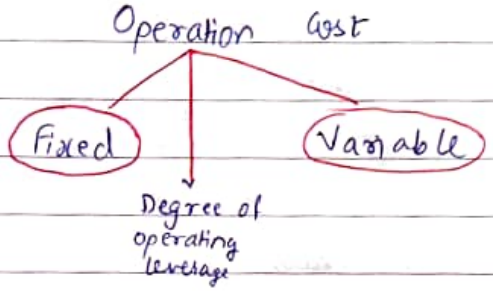
Leverage Analysis





Degree of financial leverage + Degree of operating leverage
= Combined leverage

* Degree of operating leverage (DOL)

→ This exists due to the existence of fixed cost in a firm's revenue stream.

→ OL means the ability of a firm to use fixed operating cost to magnify the effects of change in sales on changes in Profit before interest and taxes (PBIT).

$$DOL = \frac{\%\ \Delta \text{ in PBIT}}{\%\ \Delta \text{ in sales}} > 1$$

[OR]

$$DOL = \frac{\text{Total contribution}}{\text{EBIT (operating profit)}} = \frac{\text{Qty. sold} \times (S.P - V.C)}{[\text{Qty.} \times (SP - V.C.)] - F.C}$$

Operating Leverage _ 2 PDF

Q1

Sales	600L	→ P.V	(600 × 1L)
- Variable cost	360L	→ P.V	(360 × 1L)
Contribution	240L		
- Fixed cost	140L	→ Total	
Operating profit /PBT	100L		

Assume sales = 100000 units

(a) $DOL = \frac{\text{Total contribution}}{\text{PBIT}}$

$= \frac{240L}{100L} = \boxed{2.4 \text{ times}}$

$= \frac{\text{Qty.}(SP - V.C)}{[\text{Qty}(SP - VC)] - FC}$

$= \frac{1L\,(600 - 360)}{[1L\,(600 - 360)] - 140L}$

$= \frac{240}{100} = \boxed{2.4 \text{ times}}$

(b) DOL = 2.4 means, for every 1 % Δ in sales, PBIT will change by 2.4 %.

(c) If Sale ↑ by 10 %.

$DOL = \frac{\% \Delta \text{ in PBIT}}{\% \Delta \text{ in sales}}$

$\therefore \quad 2.4 = \frac{\% \Delta \text{ in PBIT}}{10\%} \qquad \therefore \% \Delta \text{ in PBIT} = \boxed{24\%}$

(2) ↓ 10% ⇒ DOL = $\frac{\% \Delta \text{ in PBIT}}{\% \Delta \text{ in Sales}}$

$\therefore 2.4 = \frac{\% \Delta \text{ in PBIT}}{-10\%}$

$\therefore \% \Delta \text{ in PBIT} = \boxed{-24\%}$

* Degree of financial leverage (DFL)

→ DFL shows the presence of fixed financial cost in revenue stream.

→ DFL shows the changes in PBIT on changes in EPS (earnings per share).

$$DFL = \frac{\% \Delta \text{ in EPS}}{\% \Delta \text{ in PBIT}} > 1$$

$$DFL = \frac{PBIT}{PBIT - Int. - \frac{Pref. div}{(1-t)}}$$

Q3 Project cost = 8 cr Earnings = 1 Cr (PBIT)

↓

$\% \Delta = 50\%$

Alternative - I (100% equity) — 10 L eq. shares of 50 each

Alternative - II (50% loan & 50% equity) — 5 L shares

Earnings ↑ 50%

PBIT	1 Cr	1.5 Cr
− Int	0	0
PBT	1 Cr	1.5
− Tax	0	0
PAT	1 Cr	1.5
− Pref Div	0	0
Profit avai. to eq. sh holders	1 Cr	1.5

Alternative - I DFL = $\frac{\% \Delta \text{ in EPS}}{\% \Delta \text{ in EBIT}} = \frac{\left(\frac{15-10}{10}\right) \times 100}{50\% \uparrow}$

$= \frac{50\%}{50\%} = \boxed{1}$ DFL

Alternative II DFL = $\frac{\left(\frac{22-12}{12}\right) \times 100}{50\%} = \frac{83.33}{50} = \boxed{1.67}$ DFL.

Indifference Point

The level of EBIT at which EPS under two diff alternatives will be same.

Q8 Leverage analysis PD=

→ Funding required for expansion = ₹ 30,00,000
Tax Rate = 35% = 0.35 Face value of equity shares = ₹100

(i) ₹30,00,000 through Equity OR ₹15,00,000 through 10% debt and ₹15,00,000 through equity

No. of shares = $\frac{30L}{100}$

$N_1 = 30,000$

↑ No. of equity shares if financing is only through equity

No. of shares = $\frac{15L}{100}$

$N_2 = 15,000$

↑ No. of equity shares if financing is done through equity & debt

Indifference Point

Equity V/s Equity & Debt

EBIT = x Int. = 10% (15L)
= 1.5L

$$\frac{x(1-t)}{N_1} = \frac{(x - \text{int.})(1-t)}{N_2}$$

$$\therefore \frac{x(1-0.35)}{30,000} = \frac{(x - 1,50,000)(1-0.35)}{15,000}$$

$$\therefore \frac{0.65x}{30000} = \frac{0.65x - 97500}{15,000}$$

$$\therefore 9750x = 19500x - 2.925 \times 10^9$$

$$\therefore 9.75x = 2925000 \Rightarrow \boxed{x = 300000}$$

Verification

	Equity	Equity & Debt
EBIT	3L	3L
- Int	-	1.5L
EBT	3L	1.5L
- Tax @ 35%	1.05L	52.5 K
EAT	1.95L	97.5 K
- Pref. div.	-	-
Profits available to eq shareholders	1.95L	97.5 K
No of shares	30K	15K
EPS	₹6.5	₹6.5

(ii) ₹30L through equity v/s 13% Pref shares for ₹10L & eq capital for ₹20L

↓

No. of equity shares = 30K

No. of eq = 20K = $\frac{20L}{100}$

Pref. div = 13% (10L) = 1.3L

$$\frac{x(1-t)}{N_1} = \frac{x(1-t) - \text{Pref div}}{N_2}$$

$$\therefore \frac{0.65x}{30,000} = \frac{0.65x - 130000}{20000}$$

$$\therefore 1.3x = 1.95x - 3,90,000$$

$$\therefore 0.65x = 3.9L$$

$$\therefore \boxed{x = 6L} \leftarrow \text{EBIT}$$

Verification

	Equity	Equity & Debt
EBIT	6L	6L
- Int.	-	-
EBT	6L	6L
- Tax @ 35·1.	2·1L	2·1L
EAT	3·9L	3·9L
- Pref. div	-	1·3L
Profit for eq. share holders	3·9L	2·6L
No. of Shares	30K	20K
EPS	13	13

(iii) ₹30L through equity V/s 13% Pref shares for 10L (Subject to dividend tax of 10%)

10% debentures of 10L

Eq. capital for ₹10L

$N_1 = \frac{30L}{100} = 30K$

$N_2 = \frac{10L}{100} = 10K$

Pref div = 13% (10L) = 1·3L

$$\frac{x(1-t)}{N_1} = \frac{(x - \text{Interest})(1-t) - \text{Pref div}(1 + DT)}{N_2}$$

where x = EBIT

$1-t$ = 1 − Tax Rate

N = No. of equity shares

Pref. div = Dividend on Pref. shares

Interest = Interest on Debentures.

DT = Dividend

(iv) 20L through equity & 10% debentures of 10L

vs

Pref shares of 10L

10% debentures of 8L

Eq. capital for 12L

CS: Capital Struct

Equity and debentures vs Equity, Pref shares & debentures

$$\frac{(x - Int)(1-t)}{N} = \frac{(x - Int.)(1-t) - Pref\ div.}{N}$$

CAPITAL STRUCTURE THEORIES

→ Capital structure includes a proportion of debt and equity
→ Whether the capital structure is optimum or not?
→ Optimum capital structure maximizes the value of the firm
→ Can a change in proportion of debt and equity maximizes the value of firm or not?
→ Should a firm borrow in the terms of debt. Yes or No
If Yes, how much?

Capital Structure Theories

CS: Capital Structure

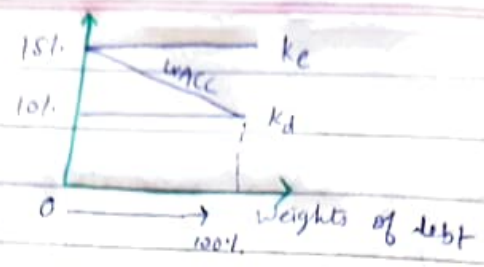
- CS Relevance Theory
  1) Net income approach (NI)
  2) Net operating income approach (NOI)
- CS Irrelevance Theory
  1) Modigliani & Miller Approach (M-M)

Net Income Approach

→ NI approach shows the relationship b/w leverage, cost of capital and value of firm.
→ NI approach states that there is a relationship b/w capital structure and value of the firm.
→ So according to NI approach, change in proportion of debt can result in change in value of the firm.

Assumptions K_d → cost of debt &
K_e → cost of equity remains constant.

→ $k_d < k_e$ → No taxes



As per NI approach, with increase in proportion of debt, value of firm increases.
→ WACC decreases

CALCULATION AS PER NI APPROACH

* Market value of equity (E) = $\frac{\text{Profit after taxes (EAT / PAT)}}{\text{Equity capitalization Rate } (K_e)}$

* Market value of debt (D) = $\frac{\text{Interest amount}}{K_d}$

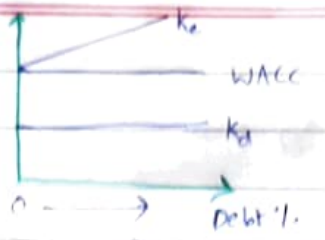
* Market value of firm = Debt + Equity

* NET OPERATING APPROACH

→ This theory is exactly opposite of NI approach.

→ According to NOI, an increase in proportion of debt will increase the risk of shareholders.

→ In order to bear this risk, shareholders will ask more return.
→ So, if proportion debt increases, K_e also increases.



CALCULATIONS AS PER NOI

* Value of unlevered firm (only equity) = $\frac{EBIT(1-t)}{k_e}$

* Value of levered firm (Equity + Debt) = Value of unlevered firm + Debt $(1-t)$

Q1 * Net Income Approach

Particulars	Firm P (levered)	Firm Q (unlevered)
EBIT	2L	2L
− Interest @ 10%	50K	−
EBT	1.5L	2L
− Taxes @ 50%	75K	1L
PAT / EAT	75K	1L
Mkt value of equity = $\frac{PAT}{k_e}$ $k_e = 15\%$	$\frac{75000}{0.15}$ = 5L	$\frac{1L}{0.15}$ = 666666.66
Mkt. value of debt = $\frac{Int.}{k_d}$ $k_d = 10\%$	$\frac{50000}{0.10}$ = 5L	−
Value of firm (E+D)	10L	6.66L.

* Net Operating Approach

Value of unlevered firm (U) = $\frac{EBIT\,(1-t)}{k_e}$

$= \frac{2L\,(1-0.5)}{0.15}$

$= \boxed{6.66L}$

Value of levered firm (P) = Value of unlevered firm + (Debt)(1-t)

$= 666666.67 + 5L(1-0.5)$

$= \boxed{916666.67}$