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ALL CONCEPTS REVISION NOTES (SUMMARIES)

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CHAPTER ONE

TIME VALUE OF MONEY

LOS 1 : INTRODUCTION

- Time value of Money is the first and the most important chapter of Finance.
- Anything connected with Finance is based on the **"TIME VALUE OF MONEY"**
- ₹ 100 today is Not Equal to ₹ 100 a year later.
- Three Factors determines the Time Value of Money:

Expected Inflation Rate
+
Return on Risk free Investment
+
Risk Premium

TVM TECHNIQUES

PRESENT VALUE / DISCOUNTING TECHNIQUES

$$PV = \frac{FV}{(1+r)^n}$$

FUTURE VALUE / COMPOUNDING TECHNIQUES

Normal Compounding [Concept of $(1+r)^n$]

Calculation of EAR

$$EAR = (1+\text{periodic rate})^m - 1$$

$$\text{Periodic Rate} = \frac{\text{Annual Rate}}{m}$$

m = No. of compounding Period

Calculation of FV

$$FV = PV\left(1+\frac{r}{m}\right)^{mxn}$$

Continuous Compounding [Concept of e^{rt}]

Calculation of FV

$$FV = PV \times e^{rt}$$

Or

$$PV = FV \times e^{-rt}$$

LOS 2 : FUTURE VALUE OF A SINGLE CASH FLOW

$$FV = PV \times (1 + r)^n$$

Example:

You invest ₹ 15,000 for two years that pays you 12% p.a. how much will you have at the end of two years?

Solution:

$$FV = PV \times (1 + r)^{n}$$
$$= 15,000 \times (1 + 0.12)^{2}$$
$$= \mathbf{18,816}$$

LOS 3 : PRESENT VALUE OF A SINGLE CASH FLOW

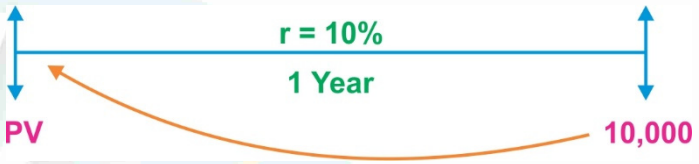
$$FV = PV \times (1 + r)^{n} \text{ or } PV = \frac{FV}{(1+r)^{n}}$$

Example:

You need ₹ 10,000 for buying a mobile next year. You can earn 10% on your money. How much do you need to invest today?

Solution:

FV = 10,000
r = 10%
n = 1 year



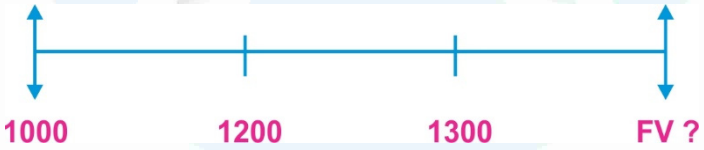
$$PV = \frac{FV}{(1+r)^{n}} \Rightarrow \frac{10,000}{(1+0.10)^{1}} \Rightarrow 9090.91$$

LOS 4 : FUTURE VALUE OF A MULTIPLE UNEQUAL CASH FLOW

Example:

Suppose you receive ₹ 1000 today, another ₹ 1200 a year later and ₹ 1300 two year later. How much will you have three years from today? Interest Rate @ 10%

Solution:



$1000 \times (1 + 0.10)^{3} = 1331$
$1200 \times (1 + 0.10)^{2} = 1452$
$1300 \times (1 + 0.10)^{1} = 1430$
4213

LOS 5 : PRESENT VALUE OF A MULTIPLE UNEQUAL CASH FLOW

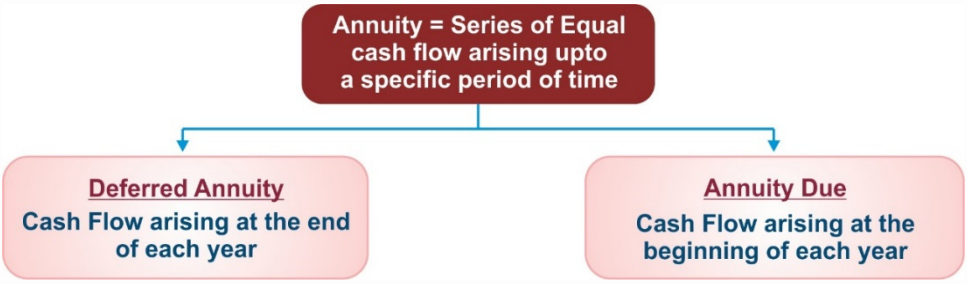
Example:

Mr. X receives ₹ 1000, 1500, 1100, 1400 & 400 at the end of year 1, 2, 3, 4 & 5. Rate = 10%, Calculate PV.

$$\frac{1000}{(1+0.10)^{1}} + \frac{1500}{(1+0.10)^{2}} + \frac{1100}{(1+0.10)^{3}} + \frac{1400}{(1+0.10)^{4}} + \frac{400}{(1+0.10)^{5}}$$

PV = **4179.30**

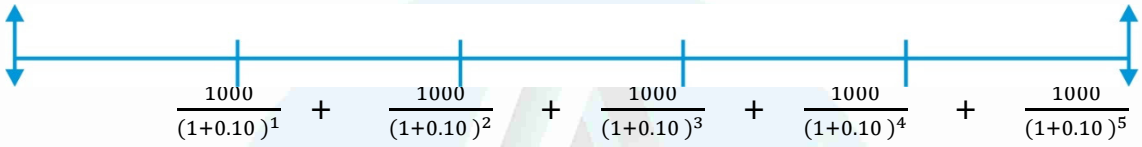
LOS 6 : Present Value of a Multiple Equal Cash Flow (Period Defined)



a) Present Value of Multiple Equal Cash Flow (Period Defined) :- (at the end of each year)

Example:

Mr. X will receive ₹ 1000 at the end of each year upto 5 years, Rate = 10%. Find Present Value.



$$\frac{1000}{(1+0.10)^1} + \frac{1000}{(1+0.10)^2} + \frac{1000}{(1+0.10)^3} + \frac{1000}{(1+0.10)^4} + \frac{1000}{(1+0.10)^5}$$

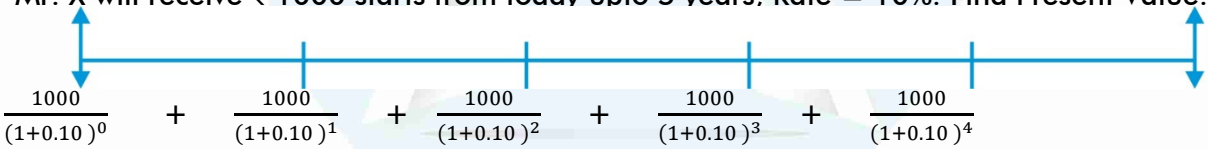
Or

PV = 1000 [PVAF @ 10% for 5 years] $\Rightarrow$ 1000 × 3.791 $\Rightarrow$ **3791**

b) Present Value of Multiple Equal Cash Flow (Period Defined) :- (at the Beginning of each year)

Example:

Mr. X will receive ₹ 1000 starts from today upto 5 years, Rate = 10%. Find Present Value.



$$\frac{1000}{(1+0.10)^0} + \frac{1000}{(1+0.10)^1} + \frac{1000}{(1+0.10)^2} + \frac{1000}{(1+0.10)^3} + \frac{1000}{(1+0.10)^4}$$

Or

PV = 1000 [1 + PVAF @ 10%, (5 – 1) years]

= 1000 × [1 + 3.17] $\Rightarrow$ 4170

Note: If question is silent always assume Deferred Annuity.

LOS 7 : Present Value of Equal Cash Flow upto Infinity (Perpetuity/ Indefinite): (Series of equal Cash Flow arising upto infinite or forever)

$$PV = \frac{\text{Annual Cash Flow}}{\text{Discount Rate}}$$

Example:

Mr. X will receive ₹ 1000 at the end of each year upto infinity, Rate = 10%. Find Present Value.

Solution:

$$PV = \frac{1000}{0.10} \Rightarrow 10{,}000$$

LOS 8: Present Value of Growing Cash Flow upto Infinity (Growing Perpetuity)

$$PV = \frac{CF_1}{\text{Discount Rate} - \text{Growth Rate}}$$

Where CF_1 = Cash Flow at the end of year 1.

Example:

Mr. X will receive ₹ 1000 at the end of year 1, thereafter cash flow will grow by 8% every year upto infinity, Rate = 10%. Find Present Value.

Solution:

$$PV = \frac{1000}{0.10 - 0.08} \Rightarrow 50{,}000$$

CHAPTER TWO
INVESTMENT DECISIONS

LOS 1: INTRODUCTION

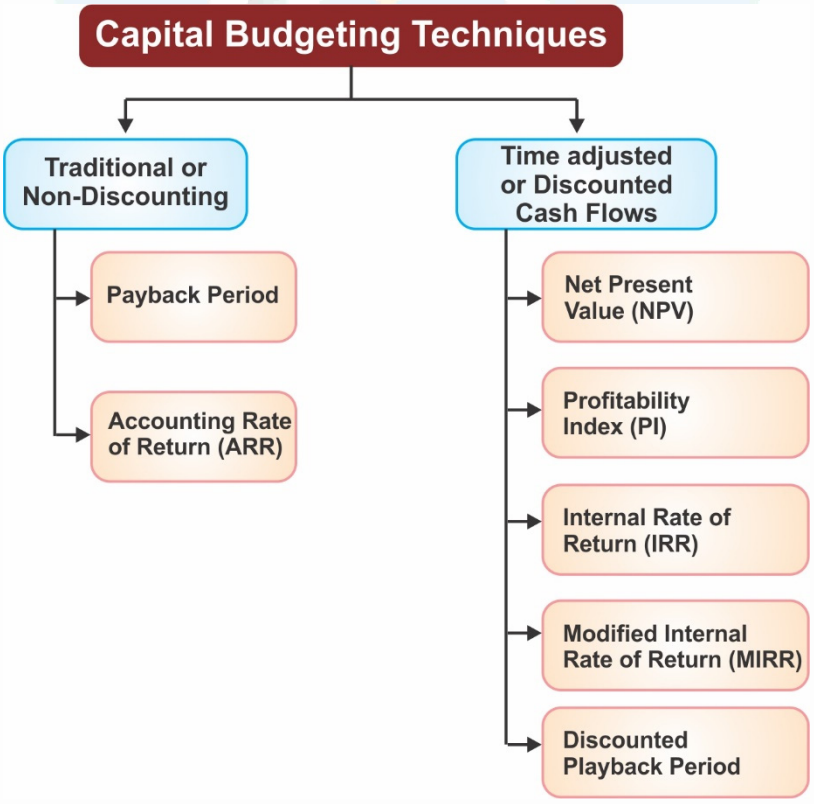
- Capital Budgeting is the process of **IDENTIFYING & EVALUATING** capital projects i.e. projects where the cash flows to the firm will be received over a period longer than a year.
- Any corporate decisions with an **IMPACT ON FUTURE EARNINGS** can be examined using capital budgeting framework.
- Categories of Capital Budgeting Projects:
  a) Replacement projects to maintain the business
  b) Replacement projects for cost reduction
  c) Expansion projects
  d) New product or market development/Diversification decisions
  e) Mandatory projects

Types of Capital Budgeting Proposals:

a) **Mutually Exclusive Proposals:** when acceptance of one proposal implies the automatic rejection of the other proposal.

b) **Complementary Proposals/Contingent decisions:** when the acceptance of one proposal implies the acceptance of other proposal complementary to it, rejection of one implies rejection of all complementary proposals.

c) **Independent Proposals/Accept-Reject decisions:** when the acceptance/rejection of one proposal doesn't affect the acceptance/rejection of other proposal.



LOS 2: NET PRESENT VALUE (NPV)

NPV=PV of Cash Inflows – PV of Cash Outflows

Decision: If NPV is

+ve	Accept the project- increase shareholder's wealth
-ve	Reject the project-decrease shareholder's wealth
Zero	Indifferent-No effect on shareholder's wealth

$$NPV = -CF0 + \frac{CF_1}{(1+k)^1} + \frac{CF_2}{(1+k)^2} + \text{----------} + \frac{CF_n}{(1+k)^n}$$

Where,

CF_0 = the initial investment outlay.

CF_t = after- tax cash flow at time t

K = required rate of return for project/minimum rate of return to be used as discount rate (WACC)

	Calculation of NPV
Discount Rate	K_0
Initial Cash Outflow	Total Cost of New Asset Add: Installation / Set-up Cost Add: Investment in Working Capital
Operating Cash Inflows (CFAT)	Future Cash flows after tax
Terminal Cash flows	SV adjusted for Tax Release of Working Capital
NPV	NPV of a project

Calculation of Future Cash Flows (CFAT)

	Sale Price Per Unit	xxx
Less :	Variable Cost Per Unit	xxx
	Contribution Per Unit	xxx
×	No. of Unit	xxx
	Total Contribution	xxx
Less :	Fixed Cost Excluding Depreciation	xxx
	EBDIT	xxx
Less :	Depreciation	xxx
	EBIT	xxx
Less :	Tax	xxx
	NOPAT	xxx
Add :	Depreciation	xxx
	CFAT	xxx

Note 1 : Treatment of Depreciation

- Depreciation is a non-cash charge, it can't be considered while calculating cash inflows or outflows but tax savings on depreciation should be considered as inflows.

Tax Saving on Depreciation = Depreciation Amount ×Tax Rate

- [EBDIT – Depreciation] [1 – Tax Rate] + Depreciation

Or

- EBDIT (1 – Tax Rate) + Tax saving on Depreciation

Methods of Depreciation:

1. Straight- line Depreciation Method:

Straight-line depreciation allocates an equal amount of depreciation each year over the asset's useful life.

$$\text{Depreciation p.a.} = \frac{\text{Original Cost} - \text{Salvage Value/Residual Value}}{\text{Life of the asset}}$$

Note:

If question is silent, always use straight-line method of depreciation.

2. Written-down value Depreciation Method:-

WDV Depreciation = [Cost - Accumulated Depreciation] × % of Depreciation

Note:

If Rate of Depreciation is given use WDV Method

- We recognize more depreciation expense in early years of the asset's life and less depreciation expense in the later years of life.

Treatment of Salvage Value Adjusted for tax – (WDV Depreciation)

1. **In Case of Profit**
   = Salvage Value – Tax Paid on Profit on Sale
2. **In Case of Loss**
   = Salvage Value + Tax Saved on Loss on Sale

Example A (In case of Profit):

Cost of Asset	1,00,000
WDV Dep.	10%
Life	5 Years
Tax@	50%
Salvage Value	70,000

Calculate Cash inflows & outflows for each year.

Solution:

Year	Cash flows
0	(1,00,000)
1	5000
2	4500
3	4050

4	3645
5	+ 3281 + (70,000 – 5476) = 67,805

1. Calculation of Depreciation:

Year	Opening Balance	WDV@10%	Closing Balance
1	100000	10000	90000
2	90000	9000	81000
3	81000	8100	72900
4	72900	7290	65610
5	65610	6561	59049

2. Calculation of Profit & Loss on Sale of Asset:

	Original Cost	1,00,000
Less :	Depreciation till date	40,951
	WDV	59,049
Less :	Salvage Value	70,000
	Profit on sale	10,951
Tax Payment on Profit on Sale of Asset @ 50%		5,476

Calculation of Salvage value Adjusted for tax = 70000-5476=64524

Example B (In case of Loss):

If Salvage Value is 35,000

Solution:

Year	Cash Flows
0	-100000
1	5000
2	4500
3	4050
4	3645
5	+3280.50 + (35000 + 12024.50) = 50305

3. Calculation of Profit & Loss on Sale of Asset:

	Original Cost	1,00,000
Less :	Depreciation till date	40,951
	WDV	59,049
Less :	Salvage Value	35,000
	Loss on sale	24,049
Tax Saving on Loss on Sale of Asset @ 50%		12,024.50

Treatment of Salvage Value Adjusted for tax – (SLM Depreciation)

Example:

Cost of Asset	1,00,000
SLM Depreciation	
Life	5 Years
Tax @	50%
Salvage Value	20,000

Calculate Cash inflows & outflows for each year.

Solution:

Year	Cash Flows
0	(1,00,000)
1	+ 8000
2	+ 8000
3	+ 8000
4	+ 8000
5	+ 8000 + (20,000 ± 0) = 28,000

Working Note

1. Calculation of Depreciation:

$$\text{Depreciation p.a} = \frac{1,00,000 - 20,000}{5} = 16,000 \text{ p.a}$$

2. Calculation of Profit & Loss on Sale of Asset:

	Original Cost	1,00,000
Less :	Depreciation till date	80,000
	WDV	20,000
Less :	Salvage Value	20,000
	Profit on sale	0

Note:

When SLM method is used, Salvage Value should not be adjusted for tax purpose, we only considered SV as inflow unless there is a adjustment related to SV.

Confusion regarding SV

1. If question states that Profit/Loss on sale of assets should be ignored then no need to adjust SV for Tax purpose.
2. Use words like "Net SV" then no need to adjust SV for Tax purpose.
3. If SV is not given in the question then do not assume SV = 0, accordingly no adjustment of SV.

Note 2 : Treatment of Interest Cost / Finance Cost

- Finance Cost are already reflected in the Projects required rate of return / WACC / K_o
- This shows that Interest on Long Term Loans as well as its Tax Saving is already considered by K_o

Note 3 : Treatment of Working Capital

		Time
Introduction of Working Capital	Outflow	Year 0
Release of Working Capital	Inflow	End of project Life

- Working Capital should never be adjusted for tax as it is a balance sheet item. Working capital is also not subject to depreciation.

Note 4 : Treatment of Tax

If we have loss in a particular year, there are two adjustments

1. **Set-off** : assumed the firm as other profitable business, Loss in a year generate tax savings in that year.
2. **Carry Forward :** The company has an individual business or a new business having no other operations, loss in a year will be carried forward to future years for the purpose of Set-off.

Note 5 : Concept of Block of Assets

- Block of Assets means a group of assets falling within a particular class of assets.
- **No depreciation** shall be charged in the year in which asset is sold.
- Tax Benefit/Loss on Short Term Capital Loss/Gain shall be calculated on **previous year WDV.**

Note 6 : Key Points to Remember

1. Decisions are based on cash flows, not accounting income:
   - Consider INCREMENTAL CASH FLOWS, the change in cash flows that will occur if the project is undertaken.
2. Sunk costs should not be included in the analysis.
   - These costs are not affected by the accept/reject decisions. Eg. Consulting fees paid to a marketing research firm to estimate demand for a new product prior to a decision on the project.
3. Externities / Cannibalization
   - When considering the full implication of a new project, loss in sales of existing products should be taken into account & also consider positive effects on sale of a firm's other product line.
4. Cash flows are based on Opportunity Costs.
   - Opportunity costs should be included in projects costs.
5. The timing of cash flows is important.
   - Cash flows received earlier are worth more than cash flows to be received later.
6. Cash flows are analyzed on an after-tax basis.

Note 6 : Treatment of Subsidy for charging Depreciation.

Alternative 1
Claim Depreciation on the full cost of asset.
Alternative 2
Claim Depreciation on Net Amount of Asset

Note 7: Replacement Decision

"Whether to repair existing machine"
Or
"Whether to replace the existing machine and buy new machine"
Case 1 : Life of new machine = Remaining Life of Old Machine
(We can apply incremental principle i.e. New – Old)
Initial Investment = Cost of New Machine – SV of Old Machine
Operating CF's = CFAT from New Machine – CFAT from Old Machine
Terminal CF's = SV from New Machine – SV from Old Machine

Case 2 : Life of new machine ≠ Remaining Life of Old Machine
We can't apply incremental principle
Use equated Annual Annuity Approach (EAA)
Steps Involved:
Step 1: Calculate NPV **or** PV of cash inflow **or** PV of cash outflow of each project.
Step 2: Calculate equated annual amount by using this formulae:

$$= \frac{NPV \text{ or } PV \text{ of cash out flow or } PV \text{ value of cash Inflow}}{PVAF\ (k\%, n \text{ years})}$$

LOS 3 : Profitability Index (PI)/ Benefit cost Ratio/ Desirability Factor/Present Value Index

Where different investment proposals each involving different initial investments and cash inflows

$$PI = \frac{\text{PV of Cash InFlows}}{CF_0 \text{ or Present value of Outflows}}$$

CF_0 = Initial Cash Out Flows

Note:

NPV = - CF_0 + PV of future Cash In Flows

CF_0 + NPV = PV of Future Cash In Flows

If NPV is given, then

Add Initial outlay in NPV to get, PV of Cash inflows.

Decision:

If NPV is Positive, the PI will be greater than one.

If NPV is Negative, the PI will be Less than one.

Rule:

If

PI > 1	Accept the project
PI < 1	Reject the project
PI = 1	Indifferent

LOS 4: Simple Pay-Back Period Method (PBP)

The pay- back period (PBP) is the number of years it takes to recover the initial cost of an investment. It is the period at which total cash inflows from the project equals to the cost of investment in the project.

Case I: When Cash inflows are Constant/ equal

$$\text{Pay-back Period} = \frac{\text{Total Initial Capital Investment}}{\text{Annual Expected after tax net Cash Inflow}}$$

Case II: When Cash inflows are unequal

Steps Involved:

a) Determine the initial investment of the project.
b) Determine the CFAT from the project for various years.
c) Compute the cumulative CFAT at the end of each year.

$$\text{Pay-back Period} = \text{Full years until recovery} + \frac{\text{Unrecovered Cost}}{\text{Cash Flow during next Year}}$$

Decision:

Shorter the PBP, better the project.

Drawback:

PBP does not take into account the time value of money and cash flows beyond the payback period.

Benefit:

The main benefit of the pay-back period is that it is a good measure of project liquidity.

LOS 5: Discount Pay-Back Period

- The discounted payback period uses the present value (PV) of project's estimated Cash flows.
- It is the number of years it takes a project to recover its initial investment in present value terms.
- Discounted pay-back period must be greater than simple pay-back period.

LOS 6: Payback Reciprocal

It is the reciprocal of Payback Period. It is computed as :

$$\text{Pay-back Reciprocal} = \frac{\text{Annual Expected after tax net Cash Inflow}}{\text{Total Initial Capital Investment}}$$

The Payback Reciprocal is considered to be an approximation of the Internal Rate of Return, if:

a) The life of the project is at least twice the payback period, and
b) The Project generates equal amount of the annual cash inflows.

Example:

A project with an initial investment of ₹ 50 lakhs and life of 10 years, generates CFAT of ₹10 lakhs per annum. Its Payback Reciprocal will be $\frac{10\ lakhs}{20\ lakhs}$ =20%.

LOS 6: IRR Techniques (Internal Rate of Return)

- IRR is the discount rate that makes the PV of a project's estimated cash inflows equal to the PV of the project's estimated cash outflows.
- i.e. IRR is the discount rate that makes the following relationship:

$$\text{PV (Inflows)} = \text{PV (Outflows)}$$

- IRR is also the discount rate for which the NPV of a project is equal to ZERO.

$$\text{IRR} = \text{Lower Rate} + \frac{\text{Lower Rate NPV}}{\text{Lower Rate NPV} - \text{Higher Rate NPV}} \times \text{Difference in Rate (HR-LR)}$$

How to find the starting rate for calculation of IRR:

Step 1: Calculate Fake Pay-back period:

$$\text{Fake Pay-back Period} = \frac{\text{Initial Investment}}{\text{Average Annual Cash Flow}}$$

Step 2: Locate the above figure in Present Value Annuity Factor Table and take this discount rate to start the calculation of IRR.

Accept/Reject Criteria:

IRR > Cost of Capital	Accept the Proposal
IRR = Cost of Capital	Indifferent
IRR< Cost of Capital	Reject the Proposal

LOS 7: Accounting Rate of Return

Method 1:

$$\text{ARR} = \frac{\text{Annual Net Profit}}{\text{Initial Investment}}$$

Method 2:

$$\text{ARR} = \frac{\text{Average Annual Net Profit}}{\text{Initial Investment}}$$

Note:

$$\text{Average Net Profit} = \frac{NP_1 + NP_2 + NP_3 \ldots\ldots NP_n}{n}$$

Method 3: $$ARR = \frac{\text{Average Annual Net Profit}}{\text{Average Initial Investment}}$$

Note:

$$\text{Average Investment} = \frac{Opening + Closing}{2}$$

Method 4: $$ARR = \frac{\text{Average Annual Net Profit}}{\frac{Initial\ Investment - SV}{2} + SV + Release\ of\ W/C}$$

1. It ignores time value of money.
2. It takes into account accounting profits rather than cash flows.

Techniques		For Independent Project	For Mutually Exclusive Projects
Non-Discounted	Pay Back	(i) When Payback period ≤ Maximum Acceptable Payback period: Accepted (ii) When Payback period ≥ Maximum Acceptable Payback period: Rejected	Project with least Payback period should be selected
	Accounting Rate of Return (ARR)	(i) When ARR ≥ Minimum Acceptable Rate of Return: Accepted (ii) When ARR ≤ Minimum Acceptable Rate of Return: Rejected	Project with the maximum ARR should be selected.
Discounted	Net Present Value (NPV)	(i) When NPV > 0: Accepted (ii) When NPV < 0: Rejected	Project with the highest positive NPV should be selected
	Profitability Index(PI)	(i) When PI > 1: Accepted (ii) When PI < 1: Rejected	When Net Present Value is same project with highest PI should be selected
	Internal Rate of Return (IRR)	(i) When IRR > K: Accepted (ii) When IRR < K: Rejected	Project with the maximum IRR should be selected

LOS 9 : MODIFIED NPV/ IRR

- When Cost of Capital & Re-investment rate are separately given, then we calculate Modified NPV.
- **Modified IRR:** It is the discount rate at which Modified NPV is Zero.

i.e. Modified NPV = $\frac{Terminal\ Value}{(1+K_0)^n}$ - PV of Cash Outflow

'or' PV of cash outflow = $\frac{Terminal\ Value}{(1+K_0)^n}$

LOS 10 : CAPITAL RATIONING

- Capital rationing is the situation under which company is not able to undertake all +ve NPV projects due to lack of funds.
- Firm must prioritize its capital expenditure with the goal of achieving the maximum increase in value for shareholders.
- If the firm has unlimited access to capital, the firm can undertake all projects with +ve NPV.

Divisible Projects

Those projects which can be taken in parts

E.g. Construction of Flats.

Indivisible Projects

Those projects which cannot be taken in parts

E.g. Construction of Ship.

Case I: Divisible Project

Steps Involved:

Step 1: Calculate NPV of each project.

Step 2: Identify whether capital rationing exists.

Step 3: Calculate Net Profitability Index or Profitability Index (PI) for each project.

Step 4: Rank the project

Step 5: Allocate money according to rank.

Case II: Indivisible Project

Steps Involved:

Step 1: Calculate NPV of each project.

Step 2: Identify whether capital rationing exists.

Step 3: Take possible combinations of projects taking into consideration limitation of funds.

Step 4: Select that combination which gives highest NPV.

CHAPTER THREE

RISK ANALYSIS IN CAPITAL BUDGETING

LOS 1 : Probability Distribution Approach

Expected Cash Flow

$$\sum ENCF \times Probability$$

Standard Deviation:

$$\sigma = \sqrt{\sum[\text{probability} \times (\text{Given NPV} - \text{Expected NPV})^2]}$$

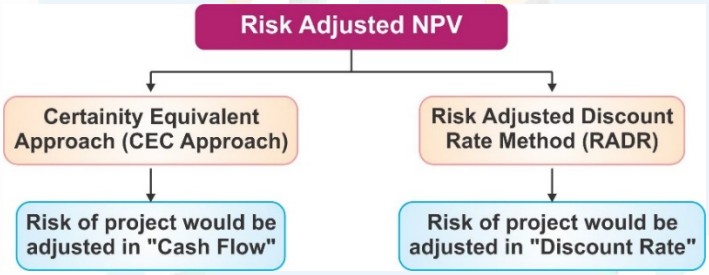
- Higher the S.D, Higher the risk & Vice-versa.

Co-efficient of Variation (CV):

$$CV = \frac{\text{Standard Deviation}}{\text{Expected NPV}}$$

Higher the CV, higher the risk & vice-versa

LOS 2 : Calculation of Risk Adjusted NPV



Risk Adjusted Discount Rate Method (RADR)

RADR = R_F + Risk Premium

Risk free rate = Rate of return on investments that bear no risk. Eg. Govt. Securities

Risk Premium= Rate of return over & above the risk free rate expected by the investor as a reward of bearing extra risk. For High Risk project, we should take High Risk premium & vice versa. For a risk free project, Risk Premium is Zero.

- Under this method, Project should be discounted using risk- adjusted discount rate rather than risk-free discount rate.
- Project having higher risk should be discounted with higher rate.
- Higher the risk of the project, higher should be the discount rate.
- NPV calculated by using RADR is known as "Risk Adjusted NPV".
- CV is a measure of risk, higher the CV, higher the risk.
- Imagine the firm to be market portfolio, K_o can be treated as R_m

RADR = R_F + Risk Index (K_o – R_F)

Certainty Equivalent Co-efficient (CEC) Method

It involves discounting of certain Cash Flows instead of Total Cash Flows.

Steps involved:

Step 1: Calculate all cash flows arising from the project.

Step 2: Calculate certain cash flow by using CEC (Certainty Equivalent Co-efficient)

Certain Cash Flow = Cash Flow × CEC

Step 3: Compute NPV by taking certain risk-free Cash Flow and risk-free discount rate.

Note:

- Higher the CEC, lower the risk and vice-versa.
- CEC of cash flow arising in year 0 will always be One.

LOS 3 : Scenario Analysis

- Scenario Analysis is an analysis of the NPV of a project under a series of specific
- scenarios (worst, most likely and best scenario) based on macro-economics, industry and firm-specific facto
- Under this, all inputs are set at their most optimistic or pessimistic or most likely levels and NPV is computed.
- Decision is based on the NPV under all scenarios.

LOS 4 : Sensitivity Analysis

- Also known as "What if" Analysis.
- Sensitivity Analysis is one of the methods of analyzing the risk surrounding the capital expenditure Decision and enables an assessment to be made of how responsive the project's NPV is to changes in those variables based on which NPV is computed.
- Sensitivity Analysis is a tool in the hand of firms to **analyze change in the project's NPV for a given change in one of the variables.**
- Under this analysis we try to measure risk of each factor taking NPV=0.
- Key factors which are used to calculate NPV are as follows:

	Inverse Effect
Cash Inflows	Decrease
Cash Outflows	Increase
Discount Rate	Increase
Life of the project	Decrease

- **Decision Rule**
- Management should pay maximum attention towards the factor where minimum percentage of adverse changes causes maximum adverse effect.

Example:

- If NPV is to become Zero with 5% change in initial investment relative to 10% change in cash inflows, project is said to be more sensitive to initial investment then to cash inflows.

Note:

Sensitivity Analysis is calculated for each factor separately, keeping other factors constant.

Method 1 : Margin of Safety Approach (MOS)

Set NPV = 0 & Calculate the Break Even Values and Margin of Safety for Each Factor

$$\text{Sensitivity (\%)} = \frac{\text{Change}}{\text{Base}} \times 100$$

Decision : Most critical / Sensitive Factor is that Factor for which MOS is least.

Method 2 : Shock Approach

Shock each Risk Factor in the adverse direction like 10% / 20% & Find out the Revised NPV or %age fall in NPV

$$\text{\% Fall In NPV} = \frac{\text{Revised NPV} - \text{Original NPV}}{\text{Original NPV}} \times 100$$

Decision : Most critical / Sensitive Factor is that Factor for which results in Maximum Fall in NPV.

NOTES

CHAPTER FOUR
DIVIDEND DECISIONS

LOS 1 : INTRODUCTION

Note: Total Earnings mean Earnings available to equity share holders

Income Statement

Sales
Less: Variable cost
Contribution
Less: Fixed cost excluding Dep.
EBITDA
Less: Depreciation and Amortization
EBIT
Less: Interest
EBT
Less: Tax
EAT
Less: Preference Dividend
Earnings Available to Equity Share holders
Less: Equity Dividend
T/F to R&S

Two types of decision are taken in Dividend Policy:-

1. Long-term financing decision
2. Wealth maximization decision

Internal Financing & External Financing :-

- Internal source of financing means using own funds i.e. Retained Earnings.
- External source of financing means taking funds from outside i.e. Equity Share Capital, Preference Share Capital, Debentures, Bonds, etc.
- Internal financing is generally less expensive because firm doesn't incur any floating cost to obtain it i.e. $K_r < K_e$

Factors Effecting Dividend Policy:-

1. Financial needs of the company
2. Desire of Share Holders
3. Industry Trend
4. Legal Constraints
5. Cost of Equity (K_e) & Rate of Return (r)
6. Ownership/Control
7. Discretion of Management
8. Liquidity needs of Company

LOS 2 : Some Basic Ratios

- EPS $= \frac{\text{Total earning available to equity shareholders}}{\text{Total number of equity shares}}$
- DPS $= \frac{\text{Total dividend paid to equity shareholders}}{\text{Total number of equity shares}}$
- MPS $= \frac{\text{Total Market Value/ Market Capitalization/ Market Cap}}{\text{Total number of equity shares}}$
- REPS $= \frac{\text{Total Retained earnings}}{\text{Total number of equity shares}}$

OR

- REPS = **EPS - DPS**
- Dividend Yield $= \frac{\text{Dividend per share}}{\text{Market price per share}} \times 100$
- Dividend pay-out Ratio $= \frac{\text{Dividend per share}}{\text{Earning per share}} \times 100$
- Dividend Rate $= \frac{\text{Dividend per share}}{\text{Face value per share}} \times 100$
- Earning Yield $= \frac{\text{Earning per share}}{\text{Market Price per share}} \times 100$
- P/E Ratio $= \frac{\text{MPS}}{\text{EPS}}$
- Retention Ratio $= \frac{\text{Retained Earning per share}}{\text{Earning per share}} \times 100$

$$= \frac{\text{EPS} - \text{DPS}}{\text{EPS}} \times 100$$

OR

- Retention Ratio = 1 – Dividend Payout Ratio

Note :

Relationship Between DPR & RR:

RR + DPR = 100% or 1

- Dividend yield and Earning Yield is always calculated on annual basis.
- Dividend is 1st paid to preference share holder before any declaration of dividend to equity shareholders.
- Dividend is always paid upon FV(Face Value) not on Market Value.

LOS 3 : Define Cash Dividends, Stock Dividend ,Stock Split

Cash Dividends: As the name implies, are payments made to shareholders in cash. They come in 3 forms:

(i) **Regular Dividends**: Occurs when a company pays out a portion of profits on a consistent basis. E.g. Quarterly, Yearly, etc.

(ii) **Special Dividends:** They are used when favourable circumstances allow the firm to make a one-time cash payment to shareholders, in addition to any regular dividends. E.g. Cyclical Firms

(iii) **Liquidating Dividends**: Occurs when company goes out of business and distributes the proceeds to shareholders.

Stock Dividends (Bonus Shares) :

- Stock Dividend are dividends paid out in new shares of stock rather than cash. In this case, there will be more shares outstanding, but each one will be worth less.
- Stock dividends are commonly expressed as a percentage. A 20% stock dividend means every shareholder gets 20% more stock.

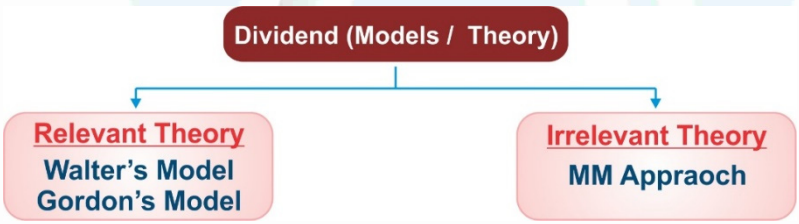
Stock Splits :

- Stock Splits divide each existing share into multiple shares, thus creating more shares. There are now more shares, but the price of each share will drop correspondingly to the number of shares created, so there is no change in the owner's wealth.
- Splits are expressed as a ratio. In a 3-for-1 stock split, each old share is split into three new shares.
- Stock splits are more common today than stock dividends.

LOS 4 : Ex – Dividend and Cum – Dividend Price of a Share

- If Question is Silent, always Assume Ex- Dividend price of share.
- If cum-dividend price is given, we must deduct dividend from it.
- It may be noted that in all the formula, we consider Ex-Dividend & not Cum-Dividend.

LOS 5 : Theories of Dividends



Relevant Theory: Dividend played an important role in determination of market price of share.

Irrelevant Theory: Dividend do not play any role in determination of market price of share/ Market value of the firm.

Walter's Model :

Walter's supports the view that the dividend policy plays an important role in determining the market price of the share.

He emphasis two factors which influence the market price of a share:-

(i) Dividend Payout Ratio.

(ii) The relationship between Internal return on Retained earnings (r) and cost of equity capital (K_e)

Walter classified all the firms into three categories:-

a) Growth Firm:

- If ($r > K_e$). In this case, the shareholder's would like the company to retain maximum amount i.e. to keep payout ratio quite low.
- In this case, there is negative correlation between dividend and market price of share.
- If $r > K_e$, Lower the Dividend Pay-out Ratio Higher the Market Price per Share & vice-versa.

b) Declining Firm:

- If ($r < K_e$). In this case, the shareholder's won't like the firm to retain the profits so that they can get higher return by investing the dividend received by them.
- In this case, there is positive correlation between dividend and market price of share.
- If $r < K_e$, Higher the Dividend Pay-out Ratio, Higher the Market Price per Share & vice-versa.

c) Constant Firm:

- If rate of return on Retained earnings (r) is equal to the cost of equity capital (K_e) i.e.($r = K_e$). In this case, the shareholder's would be indifferent about splitting off the earnings between dividend & Retained earnings.
- If $r = K_e$, Any Retention Ratio or Any Dividend Payout Ratio will not affect Market Price of share. MPS will remain same under any Dividend Payout or Retention Ratio.

Note: Walter concludes:-

- The optimum payout ratio is NIL in case of growth firm.
- The optimum payout ratio for declining firm is 100%
- The payout ratio of constant firm is irrelevant.

Summary: Optimum Dividend as per Walter's

Category of the Firm	r Vs. K_e	Correlation between DPS & MPS	Optimum Payout Ratio	Optimum Retention Ratio
Growth	$r > K_e$	Negative	0 %	100 %
Constant	$r = K_e$	No Correlation	Every payout is Optimum	Every retention is Optimum
Decline	$r < K_e$	Positive	100%	0 %

Valuation of Equity as per Walter's

Current market price of a share is the present value of two cash flow streams:-

a) Present Value of all dividend.

b) Present value of all return on retained earnings.

In order to testify the above, Walter has suggested a mathematical valuation model i.e.,

$$P_0 = \frac{DPS}{K_e} + \frac{\frac{r}{K_e}(EPS - DPS)}{K_e}$$

When

P_0 = Current price of equity share (Ex-dividend price)/ Fair or Theoretical or Intrinsic or Equilibrium or present Value Price per Share

DPS = Dividend per share paid by the firm

r = Rate of return on investment of the firm / IRR / Return on equity

K_e = Cost of equity share capital / Discount rate / expected rate of return/opportunity cost / Capitalization rate
EPS = Earnings per share of the firm
EPS – DPS = Retained Earning Per Share

Assumptions :

- DPS & EPS are constant.
- K_e & r are constant.
- Going concern assumption, company has infinite life.
- No external Finance

LOS 6 : GORDON'S MODEL/GROWTH MODEL/ DIVIDEND DISCOUNT MODEL

- Gordon's Model suggest that the dividend policy is relevant and can effect the value of the share.
- Dividend Policy is relevant as the investor's prefer current dividend as against the future uncertain Capital Gain
- Current Market price of share = PV of future Dividend, growing at a constant rate

$$P_0 = \frac{D_0(1+g)}{K_e - g_c} \text{ OR } P_0 = \frac{D_1 \text{ (next expected dividend)}}{K_e - g_c} \text{ OR } P_0 = \frac{EPS_1(1-b)}{K_e - br}$$

P_0 = Current market price of share.
K_e = Cost of equity capital/ Discount rate/ expected rate of return/ Opportunity cost/ Capitalization rate.
g = Growth rate
D_1 = DPS at the end of year / Next expected dividend / Dividend to be paid
D_0 = Current year dividend / dividend as on today / last paid dividend
EPS_1 = EPS at the end of the year
b = Retention Ratio
1-b = Dividend payout Ratio

Note:

Watch for words like ' Just paid ' or ' recently paid ', these refers to the last dividend D_0 and words like ' will pay ' or ' is expected to pay ' refers to D_1 .

Assumptions:

(i) No external finance is available.
(ii) K_e & r are constant.
(iii) 'g' is the product of its Retention Ratio 'b' and its rate of return 'r'

$$g = b \times r \text{ OR } g = RR \times ROE.$$

(iv) $K_e > g$
(v) g & RR are constant.
(vi) Firm has an infinite life

Applications

1. **$EPS_1(1-b) = DPS_1$**

Proof :

$EPS_1(1-b)$ = $EPS_1 \times$ Dividend payout Rate

$$= EPS_1 \times \frac{DPS1}{EPS1}$$

$$= DPS_1$$

We know that DPR + RR = 1 or 100%

2. If EPS = DPS, RR = 0 then g = 0

$$P_0 = \frac{D_0 (1+g)}{K_e - g}$$

$$P_0 = \frac{D_0}{K_e} \text{ as } g = 0$$

$$P_0 = \frac{EPS}{K_e} (\because \text{EPS} = \text{DPS})$$

3. Calculation of P_1 (Price at the end of year 1)

Price at the beginning = PV of Dividend at end + PV of market price at end

$$P_0 = \frac{D_1 + P_1}{(1 + K_e)}$$

4. $$K_e = \frac{1}{\text{P.E Ratio}}$$

LOS 7: CALCULATE P / E RATIO AT WHICH DIVIDEND PAYOUT WILL HAVE NO EFFECT ON THE VALUE OF THE SHARE.

When r = K_e , dividend payout ratio will not affect value of share.

Example:

If r = 10% then K_e = 10% and $K_e = \frac{1}{\text{P/ ERatio}}$ => $0.10 = \frac{1}{\text{P/ ERatio}}$

=> P/E Ratio = 10 times

LOS 8 : OVER – VALUED & UNDER – VALUED SHARES

Cases	Value	Decision
PV Market Price < Actual Market Price	Over – Valued	Sell
PV Market Price > Actual Market Price	Under – Valued	Buy
PV Market Price = Actual Market Price	Correctly Valued	Buy / Sell

LOS 9 : MULTI-STAGE DIVIDEND DISCOUNT MODEL [IF G >K E]/ VARIABLE GROWTH RATE MODEL

- Growth model is used under the assumption of g = constant.
- When more than one growth rate is given, then we will use this concept.

or

If g > K_e

- A firm may temporarily experience a growth rate that exceeds the required rate of return on firm's equity but no firm can maintain this relationship indefinitely.

Value of a dividend- paying firm that is experiencing temporarily high growth =

PV of dividends expected during high growth period.

+

PV of the constant growth value of the firm at the end of the high growth period.

$$\text{Value} = \frac{D_1}{(1+k_e)^1} + \frac{D_2}{(1+k_e)^2} + \ldots\ldots\ldots\ldots\ldots + \frac{D_n}{(1+k_e)^n} + \frac{P_n}{(1+k_e)^n}$$

$$\text{When } P_n = \frac{D_n(1+g_c)}{K_e - g_c}$$

LOS 10 : MM Approach (Irrelevance Theory)

Dividends do not play any role in determination of market value. Market value is rather affected by earnings and investment.

Formulae:

$$nP_0 = \frac{(n+m)\times P_1 + E_1 - I_1}{(1+K_e)^1}$$

n = Existing number of equity shares at the beginning of the year
m = New number of equity shares, issued at year end market price
P_0 = Current market price as on today
P_1 = Market price per share at the end of year one
E_1 = Total earning at the end of year one
I_1 = Total investment at the end of year one
K_e = Cost of equity
nP_0 = Market value of the company as on today
n+m = Total no of equity share at the end (old + new share)
$(n + m)P_1$ = Total market value of the company at the end.
Amount raised by issue of new equity shares = Investment – [Earning – Dividend]

Assumption:
Funds can raise only by equity & retained earnings.

Note:

- The Market Price of a share = PV of dividend paid at end + PV of market price at the end at the beginning of a period

$$P_0 = \frac{P_1 + D_1}{(1+K_e)^1}$$

Calculate P_1 from this formulae.

- **New number of equity share**

$$m = \frac{I_1 - (E_1 - nD_1)}{P_1} \text{ or } m = \frac{\text{Investment}_1 - (\text{Earnings}_1 - n \times \text{DPS}_1)}{\text{Market Price at the End}(P_1)}$$

LOS 11 : Graham & Dodd Model (Traditional Approach)

$$P_0 = m \times \left[DPS + \frac{EPS}{3}\right]$$

OR

$$P_0 = m \times \left[\frac{4\,DPS}{3}\right] + m \times \left[\frac{REPS}{3}\right]$$

Where m = multiplier

LOS 12: Linter's Model

We will calculate dividend to be paid by any Company.

Assumption:

Dividend should not fall. It may remain constant or may increase but can't fall.

Formula:

$$D_1 = D_0 + [EPS \times \text{Target Dividend Payout} - D_0] \times AF$$

Where

AF = Adjustment factor

D_0 = Dividend in Previous Year or Dividend Paid

D_1 = Dividend to be paid/ declared

CHAPTER FIVE

FINANCIAL ANALYSIS & PLANNING – RATIO ANALYSIS

- A ratio is defined as "the indicated quotient of two mathematical expressions and as the relationship between two or more things." Here ratio means financial ratio or accounting ratio which is a mathematical expression of the relationship between accounting figures.

Ratio Analysis

- The term financial ratio can be explained by defining how it is calculated and what the objective of this calculation is?

Calculation Basis

- A relationship expressed in mathematical terms;
- Between two individual figures or group of figures;
- Connected with each other in some logical manner; and
- Selected from financial statements of the concern

Objective for financial ratios is that all stakeholders (owners, investors, lenders, employees etc.) can draw conclusions about the

- Performance (past, present and future);
- Strengths & weaknesses of a firm; and
- Can take decisions in relation to the firm.
- Ratio analysis is based on the fact that a single accounting figure by itself may not communicate any meaningful information but when expressed as a relative to some other figure, it may definitely provide some significant information.
- Ratio analysis is not just comparing different numbers from the balance sheet, income statement, and cash flow statement. It is comparing the number against previous years, other companies, the industry, or even the economy in general for the purpose of financial analysis.

APPLICATION OF RATIO ANALYSIS IN FINANCIAL DECISION MAKING

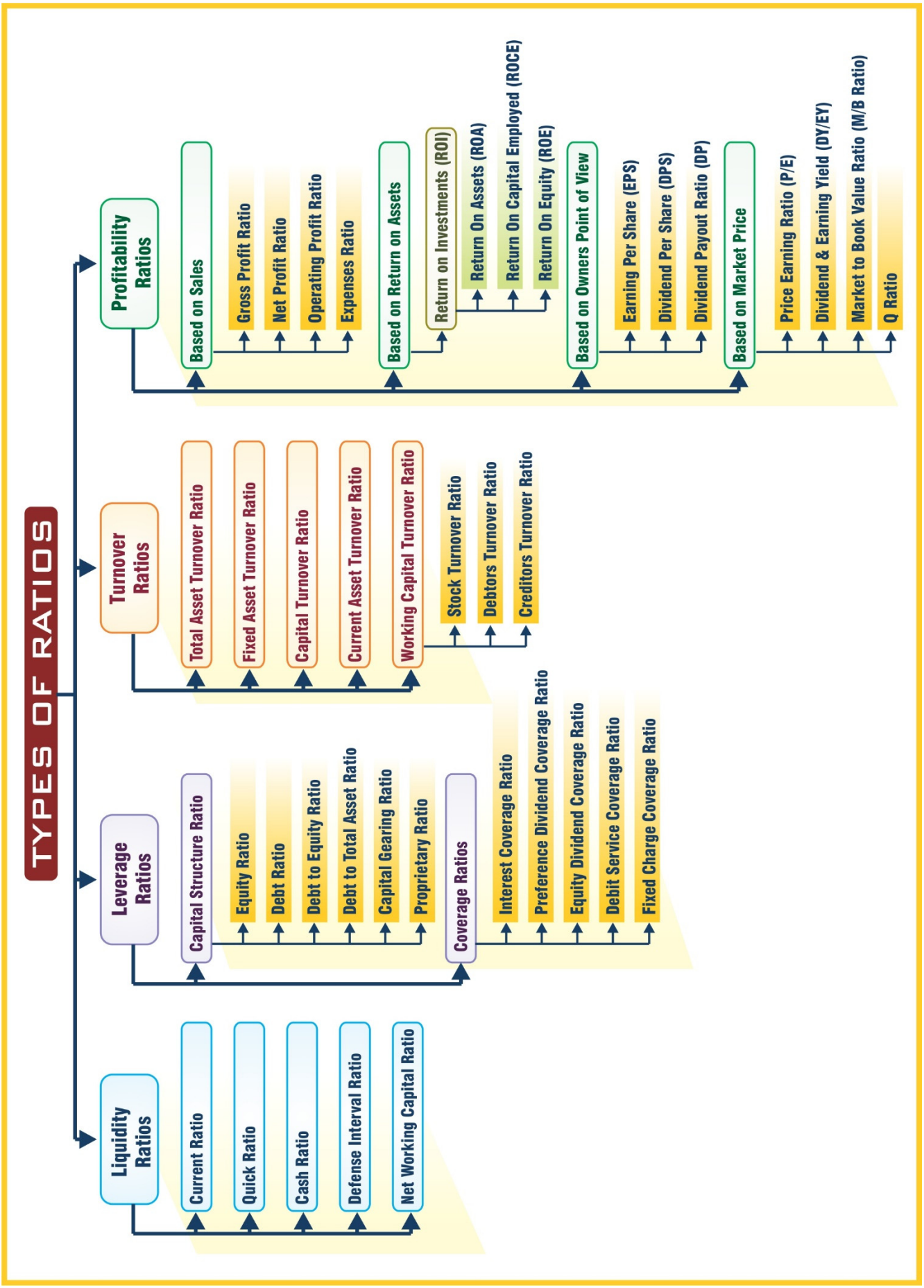
Financial Ratios for Evaluating Performance

- Liquidity Position
- Long-term Solvency
- Operating Efficiency:
- Overall Profitability:
- Inter-firm Comparison
- Financial Ratios for Budgeting

Sources of Financial Data for Analysis

The sources of information for financial statement analysis are:

(i) Annual Reports
(ii) Interim financial statements
(iii) Notes to Accounts
(iv) Statement of cash flows
(v) Business periodicals.
(vi) Credit and investment advisory services

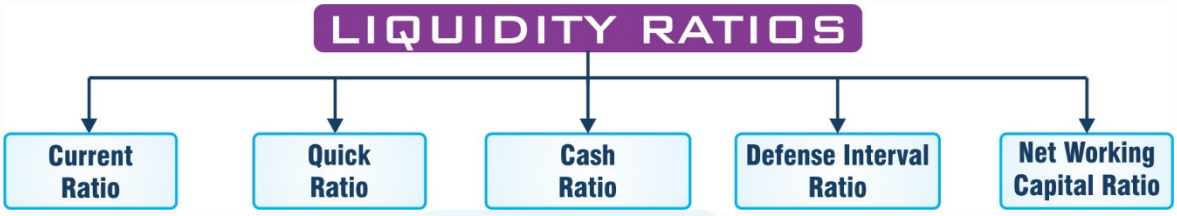

TYPES OF RATIOS
Liquidity Ratios
Current Ratio
Quick Ratio
Cash Ratio
Defense Interval Ratio
Net Working Capital Ratio
Leverage Ratios
Capital Structure Ratio
Equity Ratio
Debt Ratio
Debt to Equity Ratio
Debt to Total Asset Ratio
Capital Gearing Ratio
Proprietary Ratio
Coverage Ratios
Interest Coverage Ratio
Preference Dividend Coverage Ratio
Equity Dividend Coverage Ratio
Debit Service Coverage Ratio
Fixed Charge Coverage Ratio
Turnover Ratios
Total Asset Turnover Ratio
Fixed Asset Turnover Ratio
Capital Turnover Ratio
Current Asset Turnover Ratio
Working Capital Turnover Ratio
Stock Turnover Ratio
Debtors Turnover Ratio
Creditors Turnover Ratio
Profitability Ratios
Based on Sales
Gross Profit Ratio
Net Profit Ratio
Operating Profit Ratio
Expenses Ratio
Based on Return on Assets
Return on Investments (ROI)
Return On Assets (ROA)
Return On Capital Employed (ROCE)
Return On Equity (ROE)
Based on Owners Point of View
Earning Per Share (EPS)
Dividend Per Share (DPS)
Dividend Payout Ratio (DP)
Based on Market Price
Price Earning Ratio (P/E)
Dividend & Earning Yield (DY/EY)
Market to Book Value Ratio (M/B Ratio)
Q Ratio

1. Liquidity Ratios

The terms 'liquidity' and 'short-term solvency' are used synonymously.

Liquidity or short-term solvency means ability of the business to pay its short-term liabilities. Inability to pay-off short-term liabilities affects its credibility as well as its credit rating. Continuous default on the part of the business leads to commercial bankruptcy.

Short-term lenders and creditors of a business are very much interested to know its state of liquidity because of their financial stake. Both lack of sufficient liquidity and excess liquidity is bad for the organization.



a) Current Ratio: The Current Ratio is one of the best known measures of short term solvency. It is the most common measure of short-term liquidity.

$$\text{Current Ratio} = \frac{\textit{Current Assets}}{\textit{Current Liabilities}}$$

Where,

Current Assets	Current Liabilities
Inventories	**Creditors for goods and services**
+ Sundry Debtors	+ Short-term Loans
+ Cash and Bank Balances	+Bank Overdraft
+ Receivables/ Accruals	+ Cash Credit
+ Loans and Advances	+ Outstanding Expenses
+ Disposable Investments	+ Provision for Taxation
+ Any other current assets	+ Proposed Dividend
+ Prepaid Expenses	+ Unclaimed Dividend
	+ Current Portion of Long term Debt

Interpretation

A generally acceptable current ratio is 2 to 1. But whether or not a specific ratio is satisfactory depends on the nature of the business and the characteristics of its current assets and liabilities.

b) Quick Ratios: The Quick Ratio is sometimes called the "acid-test" ratio and is one of the best measures of liquidity.

$$\text{Quick Ratio} = \frac{\textit{Quick Assets}}{\textit{Current Liabilities}}$$

Where,

Quick Assets = Current Assets - Inventories – Prepaid Expenses

Current Liabilities = As mentioned under Current Ratio.

The Quick Ratio is a much more conservative measure of short-term liquidity than the Current Ratio.

Quick Assets consist of only cash and near cash assets. Inventories are deducted from current assets on the belief that these are not 'near cash assets'

Interpretation

An acid-test of 1:1 is considered satisfactory unless the majority of "quick assets" are in accounts receivable, and the pattern of accounts receivable collection lags behind the schedule for paying current liabilities.

c) **Cash Ratio/ Absolute Liquidity Ratio:** The cash ratio measures the absolute liquidity of the business. This ratio considers only the absolute liquidity available with the firm.

$$\text{Cash Ratio} = \frac{\text{Cash \& Bank Balances} + \text{Marketable Securities or Current Investments}}{\text{Current Liabilities}}$$

d) **Basic Defense Interval/ Interval Measure:**

$$\text{Basic Defense Interval} = \frac{\text{Cash \& Bank Balances} + \text{Marketable Securities}}{\text{Daily Operating Expenses}}$$

Or

$$\text{Interval Measure} = \frac{\text{Current Assets} - \text{Inventories}}{\text{Daily Operating Expenses}}$$

Note : Daily operating Expenses

$$= \frac{\text{Cost of good sold} + \text{Selling Administation and other General Expenses} - \text{Depreciation other non-cash expenditure}}{\text{No.of Days in a year}}$$

Interpretation

If for some reason all the company's revenues were to suddenly cease, the Basic Defense Interval would help determine the number of days the company can cover its cash expenses without the aid of additional financing.

e) **Net Working Capital Ratio:** Net working capital is more a measure of cash flow than a ratio. The result of this calculation must be a positive number.

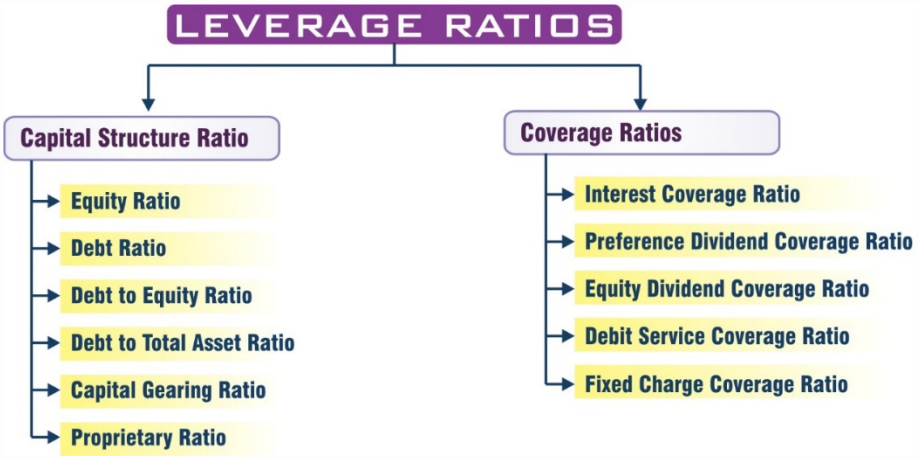
Net Working Capital Ratio = Current Assets – Current Liabilities

2. Long-term Solvency Ratio /Leverage Ratio

The leverage ratios may be defined as those financial ratios which measure the long term stability and structure of the firm. These ratios indicate the mix of funds provided by owners and lenders and assure the lenders of the long term funds with regard to:

(i) Periodic payment of interest and

(ii) Repayment of principal amount



A. Capital Structure Ratios

These ratios provide an insight into the financing techniques used by a business and focus, as a consequence, on the long-term solvency position.

From the balance sheet one can get only the absolute fund employed and its sources, but only capital structure ratios show the relative weight of different sources.

a) Equity Ratio:

This ratio indicates proportion of owners' fund to total fund invested in the business. Traditionally, it is believed that higher the proportion of owners' fund lower is the degree of risk.

$$\text{Equity Ratio} = \frac{Sharedholders' Equity}{Total\ Capital\ Employed}$$

b) Debt Ratio:

It shows the proportion of interest bearing debt in the capital structure.

$$\text{Debt Ratio} = \frac{Debt}{Debt + Net\ Worth}$$

OR

$$\text{Debt Ratio} = \frac{Debt}{Net\ Assets}$$

Total debt or total outside liabilities includes

- long term borrowings from financial institutions,
- debentures/bonds,
- deferred payment arrangements for buying capital equipments,
- bank borrowings,
- public deposits and
- any other interest bearing loan.

Interpretation

This ratio is used to analyse the long-term solvency of a firm.

c) Debt to Equity Ratio:

$$\text{Debt to Equity Ratio} = \frac{Debt}{Shareholders' Equity}$$

The shareholders' equity is

Equity Share Capital

+ reserve & surplus

+ preference share capital

- fictitious assets etc.

Interpretation

A high debt to equities ratio here means less protection for creditors, a low ratio, on the other hand, indicates a wider safety cushion.

This ratio indicates the proportion of debt fund in relation to equity.

Debt equity ratio is the indicator of firm's financial leverage.

d) Debt to Total Assets Ratio:

This ratio measures the proportion of total assets financed with debt and, therefore, the extent of financial leverage.

$$\textbf{Debt to Total Asset Ratio} = \frac{Debt}{Total\ Assets}$$

e) **Capital Gearing Ratio:** Capital gearing ratio shows the proportion of fixed interest (dividend) bearing capital to funds belonging to equity shareholders i.e. equity funds or net worth.

$$\textbf{Capital Gearing Ratio} = \frac{Preference\ Share\ Capital + Debenture + Other\ Borrowed\ Funds}{Equity\ Share\ Capital + Reserve\ and\ Surplus - Losses}$$

f) **Proprietary Ratio:**

$$\textbf{Proprietary Ratio} = \frac{Proprietary\ Fund}{Total\ Assets}$$

- **Proprietary fund includes**
  Equity Share Capital
  + Preference Share Capital
  + Reserve & Surplus.
- Total assets exclude fictitious assets and losses.

Interpretation

It indicates the proportion of total assets financed by shareholders.

B. Coverage Ratios:

The coverage ratios measure the firm's ability to service the fixed liabilities. These ratios establish the relationship between fixed claims and what is normally available out of which these claims are to be paid. The fixed claims consist of:

(i) Interest on loans
(ii) Preference dividend
(iii) Amortisation of principal or repayment of the instalment of loans or redemption of preference capital on maturity.

a) **Interest Coverage Ratio:** This ratio also known as "times interest earned ratio" indicates the firm's ability to meet interest (and other fixed-charges) obligations.

$$\textbf{Interest Coverage Ratio} = \frac{EBIT}{Interest}$$

Interpretation

- It shows the times interest charges are covered by funds that are available for their payment.
- A high interest coverage ratio means that an enterprise can easily meet its interest obligations even if earnings before interest and taxes suffer a considerable decline.
- A lower ratio indicates excessive use of debt or inefficient operations.

b) **Preference Dividend Coverage Ratio:** This ratio measures the ability of a firm to pay dividend on preference shares which carry a stated rate of return.

$$\textbf{Preference Dividend Coverage Ratio} = \frac{Net\ Profit\ or\ Earning\ after\ taxes\ or\ PAT}{Preference\ Dividend\ Liability}$$

Interpretation

This ratio indicates margin of safety available to the preference shareholders. A higher ratio is desirable from preference shareholders point of view.

c) **Equity Dividend Coverage Ratio:** It can also be calculated taking (EAT – Pref. Dividend) and equity fund figures into consideration.

$$\textbf{Equity Dividend Coverage Ratio} = \frac{PAT - Prefrence\ Dividend}{Equity\ Dividend}$$

d) **Debt Service Coverage Ratio (DSCR):** Lenders are interested in debt service coverage to judge the firm's ability to pay off current interest and instalments.

$$\textbf{Debt Service Coverage Ratio} = \frac{Earning\ available\ for\ debt\ service}{Interest + Principal\ Repayment}$$

Earning for debt service = Net profit (Earning after taxes)
+ Non-cash operating expenses like depreciation and other amortizations
+ Interest
+other adjustments like loss on sale of Fixed Asset etc.

Interpretation

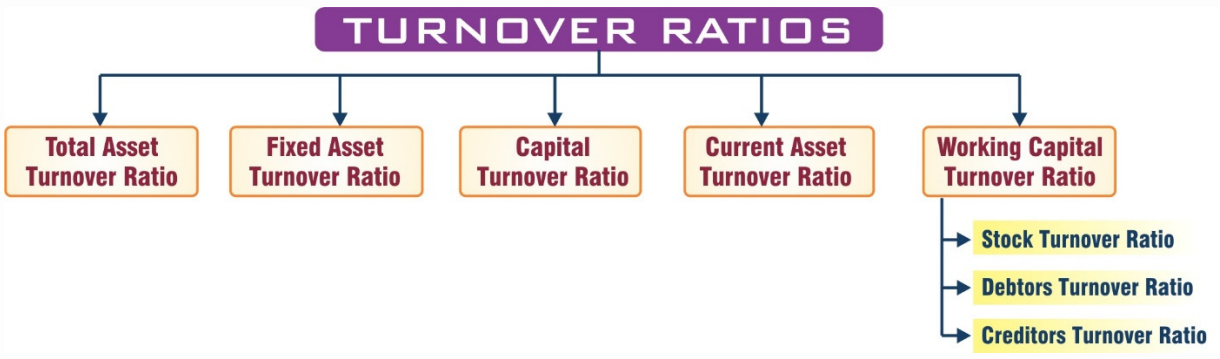
Normally DSCR of 1.5 to 2 is satisfactory. You may note that sometimes in both numerator and denominator lease rentals may be added.

e) **Fixed Charges Coverage Ratio:** This ratio shows how many times the cash flow before interest and taxes covers all fixed financing charges. This ratio is more than 1 is considered as safe.

$$\textbf{Fixed Charges Coverage Ratio} = \frac{EBIT + Depreciation}{Interest + \frac{\text{Repayment of Loan}}{(1 - tax\ rate)}}$$

3. Activity Ratio/ Efficiency Ratio/ Performance Ratio/ Turnover Ratio

These ratios are employed to evaluate the efficiency with which the firm manages and utilises its assets. These ratios usually indicate the frequency of sales with respect to its assets. These assets may be capital assets or working capital or average inventory.



These ratios are usually calculated with reference to sales/cost of goods sold and are expressed in terms of rate or times.

a) **Total Asset Turnover Ratio:** This ratio measures the efficiency with which the firm uses its total assets.

$$\text{Total Asset Turnover Ratio} = \frac{Sales\ /Cost\ of\ Goods\ Sold}{Average\ Total\ Assets}$$

b) **Fixed Assets Turnover Ratio:** It measures the efficiency with which the firm uses its fixed assets.

$$\text{Fixed Assets Turnover Ratio} = \frac{Sales\ /Cost\ of\ Goods\ Sold}{\text{Fixed } Assets}$$

Interpretation

A high fixed assets turnover ratio indicates efficient utilisation of fixed assets in generating sales. A firm whose plant and machinery are old may show a higher fixed assets turnover ratio than the firm which has purchased them recently.

c) **Capital Turnover Ratio/ Net Asset Turnover Ratio:**

$$\text{Capital Turnover Ratio/ Net Asset Turnover Ratio} = \frac{Sales\ /Cost\ of\ Goods\ Sold}{Net\ Assets\ or\ Capital\ Employed}$$

Interpretation

- This ratio indicates the firm's ability of generating sales/ Cost of Goods Sold per rupee of long term investment. The higher the ratio, the more efficient is the utilisation of owner's and long-term creditors' funds.
- Net Assets includes Net Fixed Assets and Net Current Assets (Current Assets – Current Liabilities). Since Net Assets equals to capital employed it is also known as Capital Turnover Ratio.

d) **Current Assets Turnover Ratio:** It measures the efficiency using the current assets by the firm

$$\text{Current Assets Turnover Ratio} = \frac{Sales\ /Cost\ of\ Goods\ Sold}{\text{Current } Assets}$$

e) **Working Capital Turnover Ratio:**

$$\text{Working Capital Turnover Ratio} = \frac{Sales\ /Cost\ of\ Goods\ Sold}{\text{Working Capital}}$$

Note: Average of Total Assets/ Fixed Assets/ Current Assets/ Net Assets/ Working Capital/ also can be taken.

Working Capital Turnover is further segregated into Inventory Turnover, Debtors Turnover, and Creditors Turnover.

(i) **Inventory/ Stock Turnover Ratio:** This ratio also known as stock turnover ratio establishes the relationship between the cost of goods sold during the year and average inventory held during the year. It measures the efficiency with which a firm utilizes or manages its inventory.

$$\textbf{Inventory / Stock Turnover Ratio} = \frac{Cost\ of\ Good\ Sold\ /\ Sales}{Average\ Inventory}$$

$$\textbf{Where, Average Inventory} = \frac{Opening\ Stock + Closing\ Stock}{2}$$

$$\textbf{Days of Inventory Holdings (DIH)} = \frac{Average\ Inventory}{Cost\ of\ Good\ Sold} \times 360 = \frac{360}{Stock\ turnover\ Ratio}$$

In the case of inventory of raw material the inventory turnover ratio is calculated using the following formula :

$$\textbf{Raw Material Inventory Turnover Ratio} = \frac{Raw\ Material\ Consumed}{Average\ Raw\ Material\ Stock}$$

$$\textbf{Work-in-progress Inventory Turnover Ratio} = \frac{Cost\ of\ production}{Average\ Work-in-progress\ inventory}$$

Interpretation

This ratio indicates that how fast inventory is used or sold. A high ratio is good from the view point of liquidity and vice versa. A low ratio would indicate that inventory is not used/ sold/ lost and stays in a shelf or in the warehouse for a long time.

(ii) **Receivables (Debtors) Turnover Ratio:** In case firm sells goods on credit, the realization of sales revenue is delayed and the receivables are created. The cash is realised from these receivables later on.

The speed with which these receivables are collected affects the liquidity position of the firm. The debtor's turnover ratio throws light on the collection and credit policies of the firm. It measures the efficiency with which management is managing its accounts receivables. It is calculated as follows:

$$\textbf{Debtors Turnover Ratio(DTR)} = \frac{Credit\ Sales}{Average\ Accounts\ Receivable\ or\ Average\ Debtors}$$

Receivables (Debtors') Velocity: Debtors' turnover ratio indicates the average collection period. However, the average collection period can be directly calculated as follows:

$$\textbf{Receivable Velocity / Average Collection Period} = \frac{Average\ Debtors}{Credit\ Sales} \times 360$$

$$\textbf{OR}\ \frac{Average\ Debtors}{Average\ Daily\ Credit\ Sales}\ \textbf{OR}\ \frac{12\ months/52\ weeks/\ 360\ days}{Debtors\ turnover\ Ratio}$$

$$\textbf{Average Daily Credit Sales} = \frac{Credit\ Sales}{No.of\ days\ in\ a\ year\ (say\ 360)}$$

Interpretation

The average collection period measures the average number of days it takes to collect an account receivable. This ratio is also referred to as the number of days of receivable and the number of day's sales in receivables.

(iii) **Payables / Creditors Turnover Ratio:** This ratio is calculated on the same lines as receivable turnover ratio is calculated. This ratio shows the velocity of payables payment by the firm. It is calculated as follows:

$$\textbf{Payables/ Creditors Turnover Ratio} = \frac{Annual\ Net\ Credit\ Purchase}{Average\ Accounts\ Payables}$$

A low creditor's turnover ratio reflects liberal credit terms granted by supplies. While a high ratio shows that accounts are settled rapidly.

$$\textbf{Payable Velocity/ Average payment period} = \frac{Average\ Accounts\ Payables}{Annual\ Net\ Credit\ Purchase} \times 360 \textbf{ OR}$$

$$\frac{Average\ Account\ Payables}{Average\ Daily\ Credit\ Purchase} \textbf{ OR } \frac{12\ months/52\ weeks/\ 360\ days}{Creditors\ turnover\ Ratio}$$

Interpretation

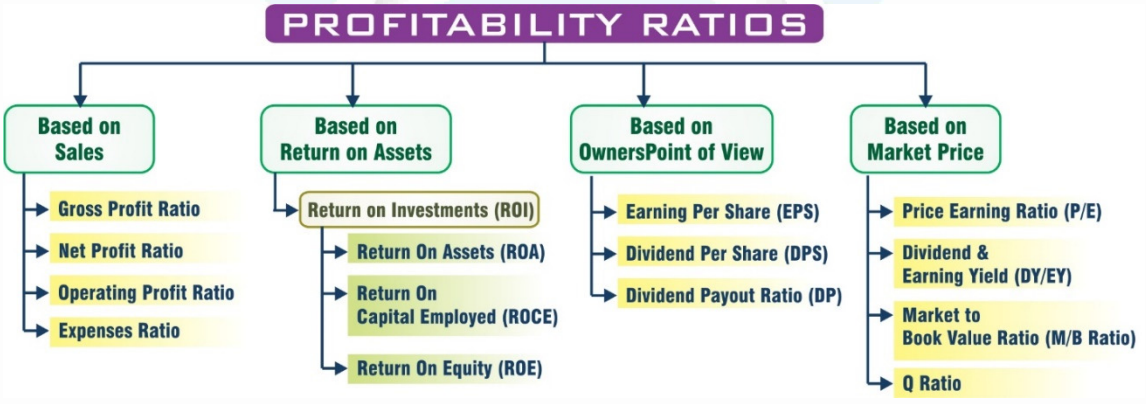
The firm can compare what credit period it receives from the suppliers and what it offers to the customers. Also it can compare the average credit period offered to the customers in the industry to which it belongs.

The above three ratios i.e. Inventory Turnover Ratio/ Receivables Turnover Ratio/Payable Turnover Ratio / is also relevant to examine liquidity of an organization.

4. Profitability Ratios

The profitability ratios measure the profitability or the operational efficiency of the firm. These ratios reflect the final results of business operations. Management attempts to maximize these ratios to maximize firm value.

The results of the firm can be evaluated in terms of its earnings with reference to a given level of assets or sales or owner's interest etc. Therefore, the profitability ratios are broadly classified in four categories:



A. Profitability Ratios based on Sales

a) **Gross Profit (G.P) Ratio/ Gross Profit Margin:** It measures the percentage of each sale in rupees remaining after payment for the goods sold.

$$\textbf{Gross Profit Ratio} = \frac{Gross\ Profit}{Sales} \times 100$$

Gross Profit = Sales – Cost of Good Sold

Interpretation

Gross profit margin depends on the relationship between price/ sales, volume and costs. A high Gross Profit Margin is a favourable sign of good management.

b) **Net Profit Ratio/ Net Profit Margin:** It measures the relationship between net profit and sales of the business.

$$\textbf{Net Profit Ratio} = \frac{Profit\ after\ Tax\ (PAT)}{Sales} \times 100$$

Interpretation

Net Profit ratio finds the proportion of sales that finds its way into profits. A high net profit ratio will ensure positive returns of the business.

c) **Operating profit ratio:**

Operating profit ratio is also calculated to evaluate operating performance of business.

$$\textbf{Operating profit ratio} = \frac{Operating\ Profit\ OR\ EBIT}{Sales} \times 100$$

Where,

Operating Profit = Sales – Operating Cost

Operating Cost = COGS + Admin Exp + S & D

EBIT = Earning before interest and tax

Interpretation

Operating profit ratio measures the percentage of each sale in rupees that remains after the payment of all costs and expenses except for interest and taxes. This ratio is followed closely by analysts because it focuses on operating results.

d) **Expenses Ratio:** Based on different concepts of expenses it can be expresses in different variants as below:

$$\text{(i) } \textbf{Cost of Good Sold (COGS) Ratio} = \frac{COGS}{Sales} \times 100$$

$$\text{(ii) } \textbf{Operating Expense Ratio} = \frac{COGS + Operating\ expenses}{Sales} \times 100$$

$$\text{(iii) } \textbf{Financial Expense Ratio} = \frac{Financial\ Expenses}{Sales} \times 100$$

B. Profitability Ratios related to Overall Return on Assets/ Investments

a) **Return on Investment (ROI):** ROI is the most important ratio of all. It is the percentage of return on funds invested in the business by its owners. In short, this ratio tells the owner whether or not all the effort put into the business has been worthwhile. It compares earnings/ returns/ profit with the investment in the company.

$$\textbf{Return on Investment (ROI)} = \frac{Return\ /Profit/Earnings}{Investments} \times 100$$

The concept of investment varies and accordingly there are three broad categories of ROI i.e.

(i) Return on Assets (ROA),

(ii) Return on Capital Employed (ROCE) and

(iii) Return on Equity (ROE).

(i) **Return on Assets (ROA):** The profitability ratio is measured in terms of relationship between net profits and assets employed to earn that profit. This ratio measures the profitability of the firm in terms of assets employed in the firm. Based on various concepts of net profit (return) and assets the ROA may be measured as follows:

$$\textbf{Return on Assets (ROA)} = \frac{Net\ Profit\ after\ taxes}{Total\ assets} \times 100$$

Here net profit is exclusive of interest. As Assets are also financed by lenders, hence ROA can be calculated as:

$$\textbf{ROTA (Return on Total Assets)} = \frac{EBIT\ (1-Tax)}{Average\ total\ assets} \times 100$$

(ii) **Return on Capital Employed (ROCE):** It is another variation of ROI.

$$\textbf{Return on Capital Employed (ROCE) (Post-Tax)} = \frac{EBIT\ (1-Tax)}{Capital\ Employed} \times 100$$

Where,
Capital Employed = Total Assets – Current Liabilities, or
= Fixed Assets + Working Capital
ROCE should always be higher than the rate at which the company borrows. Intangible assets (assets which have no physical existence like goodwill, patents and trade-marks) should be included in the capital employed. But no fictitious asset should be included within capital employed. If information is available then average capital employed shall be taken.

(iii) **Return on Equity (ROE):** Return on Equity measures the profitability of equity funds invested in the firm. This ratio reveals how profitably of the owners' funds have been utilised by the firm. It also measures the percentage return generated to equity shareholders. This ratio is computed as:

$$\textbf{Return on Equity (ROE)} = \frac{Net\ Profit\ after\ taxes - Preferences\ Dividend\ (if\ any)}{Net\ worth\ or\ equity\ shareholders\ fund} \times 100$$

- Return on equity is one of the most important indicators of a firm's profitability and potential growth. Companies that boast a high return on equity with little or no debt are able to grow without large capital expenditures, allowing the owners of the business to withdraw cash and reinvest it elsewhere.
- Many investors fail to realize, however, that two companies can have the same return on equity, yet one can be a much better business. If return on total shareholders is calculated then Net Profit after taxes (before preference dividend) shall be divided by total shareholders' fund includes preference share capital.

Return on Equity using the Du Pont Model:

- There are various components in the calculation of return on equity using the DuPont model- the net profit margin, asset turnover, and the equity multiplier. By examining each input individually, the sources of a company's return on equity can be discovered and compared to its competitors.

(i) **Profitability/Net Profit Margin:** The net profit margin is simply the after- tax profit a company generates for each rupee of revenue. Net profit margins vary across industries, making it important to compare a potential investment against its competitors.

$$\text{Net Profit Ratio} = \frac{Profit\ after\ Tax\ (PAT)}{Sales}$$

(ii) **Investment Turnover/Asset Turnover/Capital Turnover:** The asset turnover ratio is a measure of how effectively a company converts its assets into sales. It is calculated as follows:

$$\text{Total Asset Turnover Ratio} = \frac{Sales}{Total\ Assets}$$

The asset turnover ratio tends to be inversely related to the net profit margin; i.e., the higher the net profit margin, the lower the asset turnover. The result is that the investor can compare companies using different models (low-profit, high-volume vs. high-profit, low-volume) and determine which one is the more attractive business.

(iii) **Equity Multiplier:** It is possible for a company with terrible sales and margins to take on excessive debt and artificially increase its return on equity. The equity multiplier, a measure of financial leverage, allows the investor to see what portion of the return on equity is the result of debt. The equity multiplier is calculated as follows:

$$\text{Equity Multiplier} = \frac{Total\ Assets}{\text{Shareholder's Equity}}$$

Calculation of Return on Equity

To calculate the return on equity using the DuPont model, simply multiply the three components (net profit margin, asset turnover, and equity multiplier.)

$$\text{Return on Equity} = \frac{Profit\ after\ Tax\ (PAT)}{Sales} \times \frac{Sales}{Total\ Assets} \times \frac{Total\ Assets}{\text{Shareholder's Equity}}$$

C. Profitability Ratios Required for Analysis from Owner's Point of View

a) **Earnings per Share (EPS):** The profitability of a firm from the point of view of ordinary shareholders can be measured in terms of number of equity shares. This is known as Earnings per share. It is calculated as follows:

$$\text{EPS} = \frac{\text{Total earning available to equity shareholders}}{\text{Total number of equity shares}}$$

b) **Dividend per Share (DPS):** Dividend per share ratio indicates the amount of profit distributed to equity shareholders per share. It is calculated as:

$$\text{DPS} = \frac{\text{Total dividend paid to equity shareholders}}{\text{Total number of equity shares}}$$

c) **Dividend Payout Ratio (DP):** This ratio measures the dividend paid in relation to net earnings. It is determined to see to how much extent earnings per share have been retained by the management for the business. It is computed as:

$$\text{Dividend pay-out Ratio} = \frac{\text{Dividend per share}}{\text{Earning per share}} \times 100$$

D. Profitability Ratios related to market/ valuation/ Investors

These ratios involve measures that consider the market value of the company's shares. Frequently share prices data are punched with the accounting data to generate new set of information. These are (a) Price- Earnings Ratio, (b) Dividend Yield, (c) Market Value/ Book Value per share, (d) Q Ratio.

a) Price- Earnings Ratio (P/E Ratio): The price earnings ratio indicates the firm's performance as expected by investors. It indicates investor's judgement about the firm's performance. It is calculated as

$$\text{P/E Ratio} = \frac{\text{MPS}}{\text{EPS}}$$

b) Dividend and Earning Yield:

$$\text{Dividend Yield} = \frac{\text{Dividend per share}}{\text{Market price per share}} \times 100$$

$$\text{Earning Yield} = \frac{\text{Earning per share}}{\text{Market Price per share}} \times 100$$

Interpretation

This ratio indicates return on investment. Yield (%) is the indicator of true return in which share capital is taken at its market value.

c) Market Value to Book Value Ratio (MVBV): It provides evaluation of how investors view the company's past and future performance

$$\text{M/B Ratio} = \frac{\text{Market Value per share}}{\text{Book Value per share}}$$

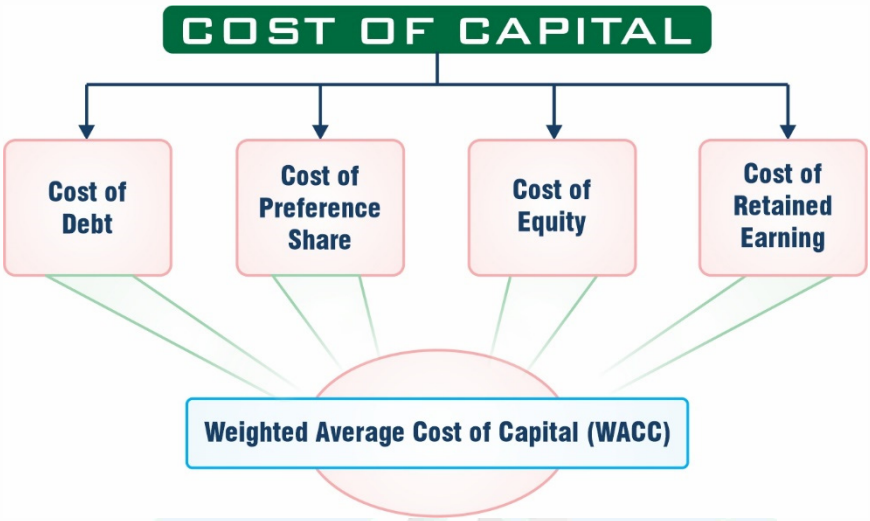
Interpretation

This ratio indicates market response of the shareholders' investment. Undoubtedly, higher the ratios better is the shareholders' position in terms of return and capital gains.

d) Q Ratio: This ratio is proposed by James Tobin, a ratio is defined as

$$\text{Q Ratio} = \frac{\text{Market Value of Assets (Equity \& Liabilities)}}{\text{Estimated Replacement Cost of Assets}}$$

CHAPTER SIX
COST OF CAPITAL



- **Cost of Capital**: Cost of capital refers to the discount rate that is used in determining the present value of the estimated future cash proceeds of the business/new project and eventually deciding whether the business/new project is worth undertaking or now.

  It is also the minimum rate of return that a firm must earn on its investment which will maintain the market value of share at its current level. It can also be stated as the opportunity cost of an investment, i.e. the rate of return that a company would otherwise be able to earn at the same risk level as the investment that has been selected.

- **Components of Cost of Capital:**

  The cost of capital can be either explicit or implicit. The explicit cost of any source of capital may be defined as the discount rate that equals that present value of the cash inflows that are incremental to the taking of financing opportunity with the present value of its incremental cash outflows.

  Implicit cost is the rate of return associated with the best investment opportunity for the firm and its shareholders that will be foregone if the project presently under consideration by the firm was accepted.

- **Measurement of Specific Cost of Capital for each source of Capital:**

  The first step in the measurement of the cost of the capital of the firm is the calculation of the cost of individual sources of raising funds. From the viewpoint of capital budgeting decisions, the long term sources of funds are relevant as they constitute the major sources of financing the fixed assets. In calculating the cost of capital, therefore the focus on long-term funds and which are:-

  1. Long term debt (including Debentures)
  2. Preference Shares
  3. Equity Capital
  4. Retained Earnings

- **Weighted Average Cost of Capital:**

  WACC (weighted average cost of capital) represents the investors' opportunity cost of taking on the risk of putting money into a company. Since every company has a capital structure i.e. what percentage of funds comes from retained earnings, equity shares, preference shares, debt and bonds, so by taking a weighted average, it can be seen how much cost/interest the company has to pay for every rupee it borrows/invest. This is the weighted average cost of capital.

Cost of capital is the return expected by the providers of capital (i.e. shareholders, lenders and the debt- holders) to the business as a compensation for their contribution to the total capital.

1. COST OF LONG TERM DEBT

External borrowings or debt instruments do not confers ownership to the providers of finance. The providers of the debt fund do not participate in the affairs of the company but enjoys the charge on the profit before taxes.

Long term debt includes long term loans from the financial institutions, capital from issuing debentures or bonds etc.

Features of debentures or bonds:

(i) **Face Value**: Debentures or Bonds are denominated with some value; this denominated value is called face value of the debenture. Interest is calculated on the face value of the debentures.

E.g. If a company issue 9% Non- convertible debentures of ₹ 100 each, this means the face value is ₹ 100 and the interest @ 9% will be calculated on this face value.

(ii) **Interest (Coupon) Rate:** Each debenture bears a fixed interest (coupon) rate (except Zero coupon bond and Deep discount bond). Interest (coupon) rate is applied to face value of debenture to calculate interest, which is payable to the holders of debentures periodically.

(iii) **Maturity period:** Debentures or Bonds has a fixed maturity period for redemption. However, in case of irredeemable debentures maturity period is not defined and it is taken as infinite.

(iv) **Redemption Value:** Redeemable debentures or bonds are redeemed on its specified maturity date. Based on the debt covenants the redemption value is determined.

(v) **Benefit of tax shield:** The payment of interest to the debenture holders are allowed as expenses for the purpose of corporate tax determination. Hence, interest paid to the debenture holders save the tax liability of the company.

a) Cost of Irredeemable Debentures

Cost of Irredeemable Debenture

$$K_d = \frac{Interest(I)}{NP}(1-t)$$

Where,

K_d = Cost of debt after tax

I = Annual interest payment

NP = Net proceeds of debentures or current market price

t = Tax rate

b) Cost of Redeemable Debentures

Cost of Redeemable Debenture

$$K_d = \frac{Interest\,(1-t)+\frac{(RV-NP)}{n}}{\frac{(RV+NP)}{2}}$$

Where,

NP = Net proceeds from debentures in case of new issue of deb or Current market price in case of existing debt.

RV = Redemption value of debentures

t = Tax rate applicable to the company

n = Life of debentures.

- If discount on issue and/ or premium on redemption are tax deductible, the following formula can be used to calculate the cost of debt.

c) Cost of Debt using Present value method [Yield to maturity (YTM) approach)]/ IRR Technique:

The cost of redeemable debt K_d is also calculated by discounting the relevant cash flows using Internal rate of return (IRR).Here YTM is the annual return of an investment from the current date till maturity date. So, YTM is the internal rate of return at which current price of a debt equals to the present value of all cashflows.

The relevant cash flows are as follows:

Year	Cash flows
0	Net proceeds in case of new issue/ Current market price in case of existing debt (NP or P_0)
1 to n	Interest net of tax [I(1-t)]
n	Redemption value (RV)

Steps to calculate relevant cash flows:

Step-1: Identify the cash flows

Step-2: Calculate NPVs of cash flows as identified above using two discount rates (guessing).

Step-3: Calculate IRR

Amortisation of Bond

A bond may be amortised every year i.e. principal is repaid every year rather than at maturity. In such a situation, the principal will go down with annual payments and interest will be computed on the outstanding amount. The cash flows of the bonds will be uneven.

The formula for determining the value of a bond or debenture that is amortised every year is as follows:

$$V_b = \frac{C_1}{(1+Kd)^1} + \frac{C_2}{(1+Kd)^2} + \cdots + \frac{Cn}{(1+Kd)^n}$$

Cost of Convertible Debenture

Holders of the convertible debentures has the option to either get the debentures redeemed into the cash or get specified numbers of companies shares in leiu of cash. The calculation of cost of convertible debentures are very much similar to the redeemable debentures. While determining the redeemable value of the debentures, it is assumed that all the debenture holders will choose the option which has the higher value and accordingly it is considered to calculate cost of debt.

- Converted into equity shares after certain period.
- Conversion Ratio = No. of share Received per Convertible Bond
- When **Conversion Value > Bond value,** option can be exercised otherwise not.

Conversion Value = No. of equity shares issued × MPS at the time of Conversion

2. COST OF PREFERENCE SHARES:

The preference share capital is paid dividend at a specified rate on face value of preference shares. Payment of dividend to the preference shareholders are not mandatory but are given priority over the equity shareholder. The payment of dividend to the preference shareholders are not charged as expenses but treated as appropriation of after tax profit. Hence, dividend paid to preference shareholders does not reduce the tax liability to the company. Like the debentures, Preference share

capital can be categorised as redeemable and irredeemable. Accordingly cost of capital for each type will be discussed here.

a) Cost of Redeemable Preference Shares

Preference shares issued by a company which are redeemed on its maturity is called redeemable preference shares. Cost of redeemable preference share is similar to the cost of redeemable debentures with the exception that the dividends paid to the preference shareholders are not tax deductible.

Cost of Redeemable Preference Share

$$K_p = \frac{PD + \frac{(RV-NP)}{n}}{\frac{(RV+NP)}{2}}$$

Where,

PD = Annual preference dividend

RV = Redemption value of preference shares

NP = Net proceeds on issue of preference shares

n = Life of preference shares.

b) Cost of Irredeemable Preference Shares

Cost of Redeemable Preference Share

$$K_p = \frac{PD}{P_0}$$

Where,

PD = Annual preference dividend

P_0 = Net proceeds in issue of preference shares

3. COST OF EQUITY SHARE CAPITAL

a) Dividend Price Approach
b) Earning Price Approach
c) Realized Yield Approach
d) Capital Asset Pricing Model (CAPM) Approach

a) Dividend Price Approach/Dividend Valuation Approach

(i) Dividend Price Approach with Constant Dividend: In this approach dividend is constant, which means there is no-growth or zero growth in dividend. The cost of equity can be calculated as follows:

$$K_e = \frac{D}{P_0}$$

Where,

Ke = Cost of equity

D = Expected dividend

P_0 = Market price of equity (ex- dividend)

This model assumes that dividends are paid at a constant rate to perpetuity.

(ii) Dividend Price Approach with Constant Growth: As per this approach the rate of dividend growth remains constant. Where earnings, dividends and equity share price all grow at the same rate, the cost of equity capital may be computed as follows:

$$K_e = \frac{D_1}{P_0} + g$$

Where,
D1 = [D_0 (1+g)] i.e. next expected dividend
P0 = Current Market price per share
g = Constant Growth Rate of Dividend.

(iii) In case of newly issued equity shares where floatation cost is incurred, the cost of equity share with an estimation of constant dividend growth is calculated as below:

$$K_e = \frac{D_1}{P_0 - F} + g$$

where, F = Flotation cost per share.

b) Earning/ Price Approach

(i) Earnings/ Price Approach with Constant Earnings

The cost of equity share capital would be based upon the expected rate of earnings of a company.

$$K_e = \frac{EPS}{Po}$$

Where,
EPS = Current earnings per share
Po = Market share price

(ii) Earnings/ Price Approach with Growth in Earnings:

$$K_e = \frac{EPS1}{Po} + g$$

Where,
EPS1 = Expected earnings per share
Po = Market price per share
g = Annual growth rate of earnings.

❖ **Estimation of Growth Rate**

The calculation of 'g' (the growth rate) is an important factor in calculating cost of equity share capital. Generally two methods are used to determine the growth rate, which are discussed below:

Method 1 : Average Method

It calculated as below:

$$D_0 = D_n (1+g)^{n-1}$$

Where,

D_0 = Current dividend,

D_n = Dividend in n years ago

Example: The current dividend is ₹16.10 and the dividend 5 year ago was ₹10. The growth rate in the dividend can found out as follows:

Method 2 : Gordon's Growth Model

This model takes Earnings retention rate (b) and rate of return on investments (r) into account to estimate the future growth rate.
It can be calculated as below:

$$Growth\ (g) = b \times r$$

Where,
r = rate of return on fund invested
b = earnings retention ratio

c) Realized Yield Approach

According to this approach, the average rate of return realized in the past few years is historically regarded as 'expected return' in the future. It computes cost of equity based on the past records of dividends actually realised by the equity shareholders.

Method 1: Holding Period Return (HPR)

$$\textbf{HPR} = \frac{(P_1 - P_0) + D_1}{P_0}$$

$$\textbf{HPR} = \frac{P_1 - P_0}{P_0} + \frac{D_1}{P_0}$$

(Capital gain Yield / Return) **(Dividend Yield / Return)**

Method 2: IRR Technique

d) Capital Asset Pricing Model (CAPM) Approach

CAPM model describes the risk-return trade-off for securities. It describes the linear relationship between risk and return for securities. Thus, the cost of equity capital can be calculated under this approach as:

$$\textbf{Cost of Equity } (K_e) = R_f + ß\ (R_m - R_f)$$

Where,

K_e = Cost of equity capital

R_f = Risk free rate of return

ß = Beta coefficient

R_m = Rate of return on market portfolio

$(R_m - R_f)$ = Market premium

4. COST OF RETAINED EARNINGS

Like another source of fund, retained earnings involve cost. It is the opportunity cost of dividends foregone by shareholders. sometime cost of retained earnings remains below the cost of equity due to saving in floatation cost and existence of personal tax.

In absence of any information on personal tax (tp):

Cost of Retained Earnings (K_r) = Cost of Equity Shares (K_e)

- If there is any information on personal tax (tp): $\mathbf{K_r = K_e\ (1\text{-}tp)(1\text{-}Brokerage)}$

Note:

- K_e of new equity will always be greater than K_e of existing equity/retained earnings.
- Floatation Cost is only applicable in case of new equity and not on existing equity (or retained earnings).

WEIGHTED AVERAGE COST OF CAPITAL (WACC)

Weighted average cost of capital is the weighted average after tax costs of the individual components of firm's capital structure. That is, the after tax cost of each debt and equity is calculated separately and added together to a single overall cost of capital.

The steps to calculate WACC is as follows:

Step 1: Calculate the total capital from all the sources.
(i.e. Long term debt capital + Pref. Share Capital + Equity Share Capital + Retained Earnings)

Step 2: Calculate the proportion (or %) of each source of capital to the total capital.

$$i.e. = \left(\frac{Equity\ Share\ Capital\ (for\ example)}{Total\ Capital\ (as\ calculated\ in\ Step\ 1\ above}\right)$$

Step 3: Multiply the proportion as calculated in Step 2 above with the respective cost of capital.
(i.e. K_e × Proportion (%) of equity share capital (for example) calculated in Step 2 above)

Step 4: Aggregate the cost of capital as calculation Step 3 above. This is the WACC. (i.e. K_e + K_d + K_p + Ks as calculated in Step 3 above

❖ Choice of weights

There is a choice weights between the book value (BV) and market value(MV).

i) **Book Value(BV):** Book value weights is operationally easy and convenient. While using BV, reserves such as share premium and retained profits are included in the BV of equity, in addition to the nominal value of share capital.

ii) **Market Value(MV):** Market value weight is more correct and represent a firm's capital structure. It is preferable to use MV weights for the equity. While using MV, reserves such as share premium and retained profits are ignored as they are in effect incorporated into the value of equity.

❖ MARGINAL COST OF CAPITAL

The marginal cost of capital may be defined as the cost of raising an additional rupee of capital. Since the capital is raised in substantial amount in practice, marginal cost is referred to as the cost incurred in raising new funds. Marginal cost of capital is derived, when the average cost of capital is calculated using the marginal weights.

Two Assumptions:

1) That each marginal rupee raised will be in the proportion of Target Capital Structure.
2) That the least costly segment of each source of finance will be tapped first until it get exhausted, the most costly segment will be tapped after its exhaustion.

NOTES

CHAPTER SEVEN

FINANCING DECISIONS – CAPITAL STRUCTURE

MEANING OF CAPITAL STRUCTURE

- Capital structure refers to the mix of a firm's capitalisation (i.e. mix of long term sources of funds such as debentures, preference share capital, equity share capital and retained earnings for meeting total capital requirement). While choosing a suitable financing pattern, certain factors like cost, risk, control, flexibility and other considerations like nature of industry, competition in the industry etc. should be considered
- Capital Structure decision refers to deciding the forms of financing (which sources to be tapped); their actual requirements (amount to be funded) and their relative proportions (mix) in total capitalisation.

$$Value\ of\ the\ firm = \frac{EBIT}{Overall\ cost\ of\ capital\ /Weighted\ average\ cost\ of\ capital}$$

$$K_0 = (Cost\ of\ debt \times weight\ of\ debt) + (Cost\ of\ equity \times weight\ of\ equity)$$

$$K_O = \left[K_d \times \frac{D}{D+E}\right] + \left[K_e \times \frac{E}{D+E}\right]$$

Where:

K_o is the weighted average cost of capital (WACC)
K_d is the cost of debt
D is the market value of debt
E is the market value of equity
K_e is the cost of equity

Meaning of optimal capital structure

- The theory of optimal capital structure deals with the issue of the right mix of debt and equity in the long term capital structure of a firm.
- This theory states that if a company takes on debt, the value of the firm increases up to a point.
- Beyond that point if debt continues to increase then the value of the firm will start to decrease.

EBIT-EPS-MPS analysis

- EBIT-EPS analysis is a vital tool for designing the optimal capital structure of a company.
- The main objective of this analysis is to find the EBIT level that will equate EPS regardless of the financing plan chosen.
- The financial leverage affects the pattern of distribution of operating profit among various types of investors and increases the variability of the EPS of the firm.
- Therefore, while searching for an appropriate capitals structure for a firm, the financial manager must analyse the effects of various alternative financial leverages on the EPS.
- The effect of leverage on the EPS emerges because of the existence of fixed financial charge (i.e., interest on debt and fixed dividend on preference share capital).

Relationship between the rate of return on assets and the rate of fixed charge:

- If the rate of return on assets is higher than the cost of financing, then the increasing use of fixed charge financing (i.e., debt and preference share capital) will result in increase in the EPS.
- This situation is also known as favourable financial leverage or Trading on Equity.
- On the other hand, if the rate of return on assets is less than the cost of financing, then the effect may be negative and, therefore, the increasing use of debt and preference share capital may reduce the EPS of the firm.

Reasons for choice between debt financing and preference shares at the time of deciding fixed financial charge financing.

- **The choice is tilted in favour of debt financing for two reasons:**

  (i) The explicit cost of debt financing i.e., the rate of interest payable on debt instruments or loans is generally lower than the rate of fixed dividend payable on preference shares, and

  (ii) Interest on debt financing is tax-deductible and therefore the real cost (after-tax) is lower than the cost of preference share capital.

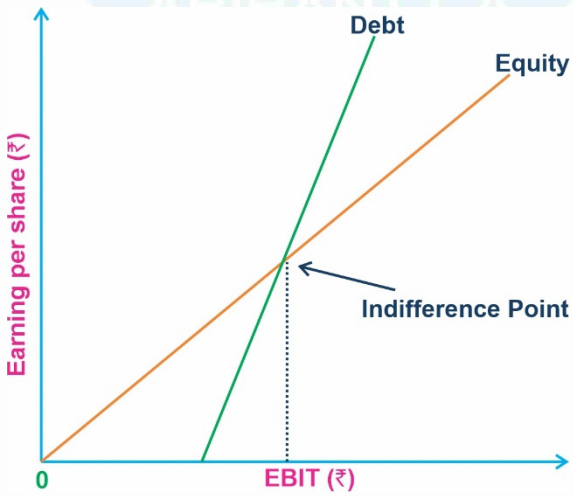
Concept of Financial Break-even and Indifference Analysis.

A. Financial break-even:

- Financial break-even point is the minimum level of EBIT needed to satisfy all the fixed financial charges i.e. interest and preference dividends.
- It denotes the level of EBIT for which the company's EPS equals zero.
- If the EBIT is less than the financial breakeven point, then the EPS will be negative.
- But if the expected level of EBIT is more than the breakeven point, then more fixed costs financing instruments can be taken in the capital structure, otherwise, equity would be preferred.
- Computation: Interest + $\frac{Preference\ Dividend}{(1-Tax\ rate)}$

B. Indifference Analysis:

- One method of considering the impact of various financing alternatives on earnings per share is to prepare the EBIT chart or the range of Earnings Chart.



- At a given EBIT, earnings per share under various alternatives of financing may be plotted.
- A straight line representing the EPS at various levels of EBIT under the alternative may be drawn.
- Wherever this line intersects, it is known as break-even point.

- This is known as EPS equivalency point or indifference point since this shows that, between the two given alternatives of financing (i.e., regardless of leverage in the financial plans), EPS would be the same at the given level of EBIT.
- It is the level of EBIT where we are indifferent between 2 options available i.e. EPS of 2 Capital Structure are same.

$$EPS_A = EPS_B$$

The equivalency or indifference point can also be calculated algebraically in the following manner:

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

Where,
EBIT = Indifference point
E_1 = Number of equity shares in Alternative 1
E_2 = Number of equity shares in Alternative 2
I_1 = Interest charges in Alternative 1
I_2 = Interest charges in Alternative 2
T = Tax-rate
Alternative 1 = All equity finance
Alternative 2 = Debt-equity finance.

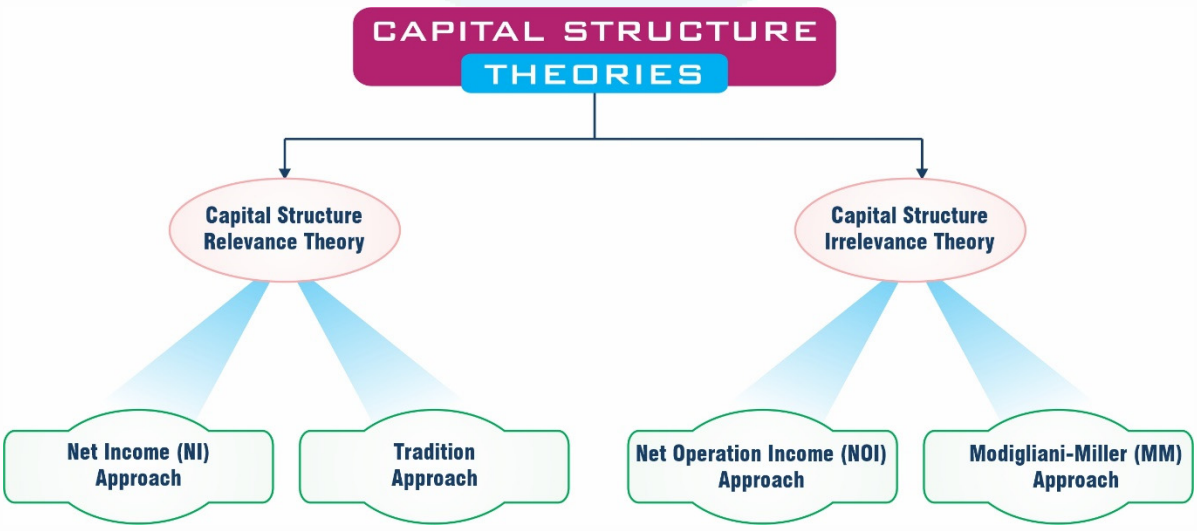
Note: There may be circumstances where EBIT may get cancelled from both sides, then in such case there is no indifferent point between the 2 plans.

In such case, it implies that one plan will always be superior than the 2nd plan.

Note: Indifference point is always between 2plans, if we have 3 plans in our question than we should calculate in combinations.

CAPITAL STRUCTURE THEORIES

The following approaches explain the relationship between cost of capital, capital structure and value of the firm:



(A) **Net Income (NI) approach**
(B) **Net Operating Income (NOI) approach**
(C) **Traditional approach**
(D) **Modigliani-Miller (MM) approach**

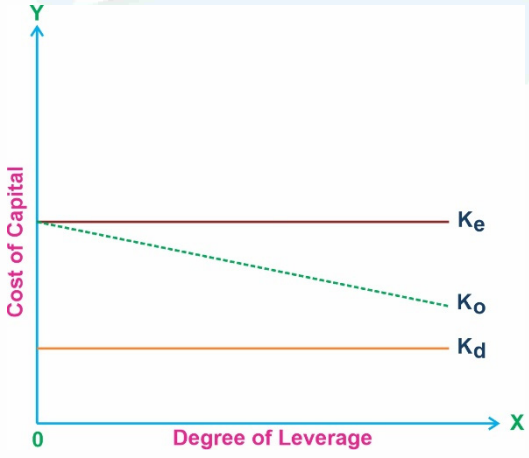
Following assumptions are made to understand this relationship:

1. There are only two kinds of funds used by a firm i.e. debt and equity.
2. The total assets of the firm are constant and there would be no change in investment decision of firm.
3. The firm distributes the entire EBIT among its finance providers i.e. Interest & 100% DPR.
4. The operating profits of the firm are expected to remain constant over times.
5. Business risk is constant over time & it is not affected by the financial mix.
6. There is no Corporate Tax and Personal Tax.
7. The investor's having same expectations of returns.
8. Kd < ke
9. There is no floating cost.
10. The firm has perpetual life.
11. Value of Firm $(V_F)=\frac{EBIT}{Ko}$

A. Net Income (NI) Approach (David Durond)

Additional Assumption: The cost of debt & cost of equity remain constant at all levels of leverage (kd & ke are always constant). Use of more & more debt financing in capital structure doesn't affect the risk perception of the investor.

- According to this approach, capital structure decision is relevant to the value of the firm.
- An increase in financial leverage will lead to decline in the weighted average cost of capital (WACC), while the value of the firm as well as market price of ordinary share will increase.
- Conversely, a decrease in the leverage will cause an increase in the overall cost of capital and a consequent decline in the value as well as market price of equity shares.
- From the below diagram, K_e and K_d are assumed not to change with leverage. As debt increases, it causes weighted average cost of capital (WACC) to decrease.



The value of the firm on the basis of Net Income Approach can be ascertained as follows:

$$Value\ of\ firm\ = E + D$$

Where,
V = Value of the firm
E = Market value of equity
D = Market value of debt

$$Market\ Value\ of\ equity\ (E) = \frac{NI}{K_e}$$

$$Market\ Value\ of\ Debt\ (D) = \frac{Interest}{K_d}$$

Where,
NI = Earnings available for equity shareholders
K_e = Equity Capitalisation rate

- Under, NI approach, the value of the firm will be maximum at a point where weighted average cost of capital (WACC) is minimum.
- Thus, the theory suggests total or maximum possible debt financing for minimising the cost of capital.

The overall cost of capital under this approach is :

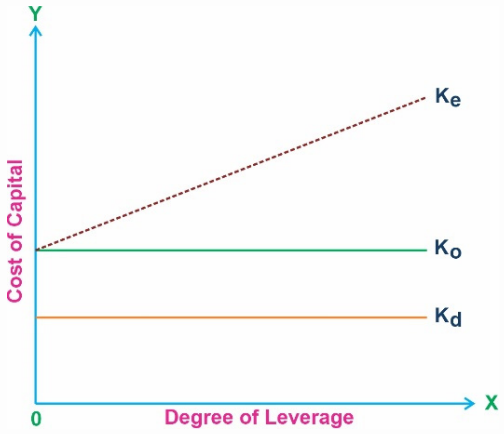
$$Overall\ cost\ of\ capital\ = \frac{EBIT}{Value\ of\ the\ firm}$$

- Thus according to this approach, the firm can increase its total value by decreasing its overall cost of capital through increasing the degree of leverage.
- The significant conclusion of this approach is that it pleads for the firm to employ as much debt as possible to maximise its value.

B. Net Operating Income Approach (NOI) (David Durond)

- **Additional Assumption:** The overall cost of capital, ko of the firm is constant at all levels of leverage. The cost of debt (kd) is also taken as constant at all levels of leverage.

- NOI means earnings before interest and tax (EBIT).
- According to this approach, capital structure decisions of the firm are irrelevant.
- Any change in the leverage will not lead to any change in the total value of the firm and the market price of shares, as the overall cost of capital is independent of the degree of leverage. As a result, the division between debt and equity is irrelevant.
- As per this approach, an increase in the use of debt which is apparently cheaper is offset by an increase in the equity capitalisation rate.
- This happens because equity investors seek higher compensation as they are opposed to greater risk due to the existence of fixed return securities in the capital structure.



The above diagram shows that K_O (Overall capitalisation rate) and (debt – capitalisation rate) are constant and K_e (Cost of equity) increases with leverage.

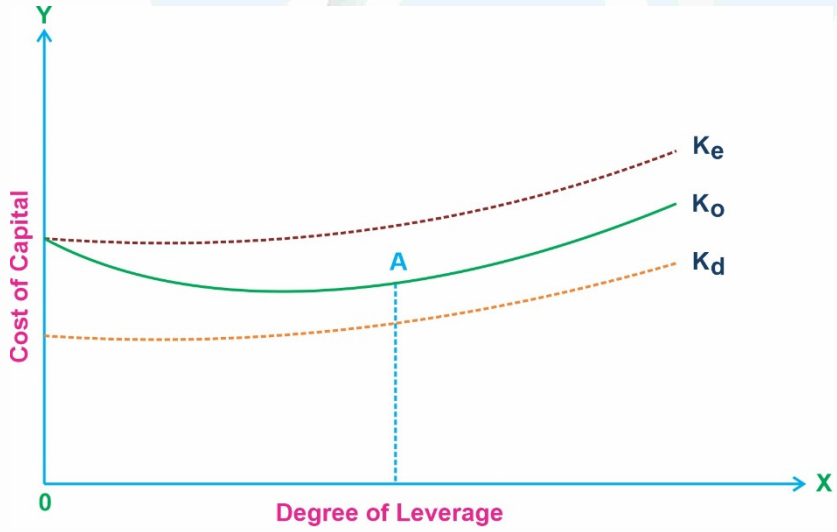
C. Traditional Approach (Era Soloman)

- **Additional Assumption:** kd & ke rise slowly with regular increase in leverage but continuous rise in leverage causes slow increase at first & than sharp increase in both kd & ke after continuous rise in leverage.

  The optimum capital structure is one where ko is minimum & value of firm is maximum.

- Traditional approach favours that as a result of financial leverage up to some point, cost of capital comes down and value of firm increases. However, beyond that point, reverse trends emerge.
- Under this approach it is believed that there is an optimal capital structure which minimizes the cost of capital.

  Optimum capital structure occurs at the point where value of the firm is highest and the cost of capital is the lowest.



The main highlights of traditional approach are mentioned as below:

a) Capital Structure:

- The firm should strive to reach the optimal capital structure and its total valuation through a judicious use of the both debt and equity in capital structure.
- At the optimal capital structure, the overall cost of capital will be minimum and the value of the firm will be maximum.

b) Financial Leverage:

- Value of the firm increases with financial leverage up to a certain point.
- Beyond this point the increase in financial leverage will increase its overall cost of capital and hence the value of firm will decline.
- This is because the benefits of use of debt may be so large that even after offsetting the effect of increase in cost of equity, the overall cost of capital may still go down.
- However, if financial leverage increases beyond an acceptable limit, the risk of debt investor may also increase, consequently cost of debt also starts increasing.
- The increasing cost of equity owing to increased financial risk and increasing cost of debt makes the overall cost of capital to increase.

D. Modigliani-Miller Approach (MM)

- The NOI approach is definitional or conceptual and lacks behavioural significance. It does not provide operational justification for irrelevance of capital structure.
- However, Modigliani-Miller approach provides behavioural justification for constant overall cost of capital and therefore, total value of the firm.

MM Approach- 1958: without tax:

- This approach describes, in a perfect capital market where there is no transaction cost and no taxes, the value and cost of capital of a company remain unchanged irrespective of change in the capital structure.
- The approach is based on further additional assumptions like:

- Capital markets are perfect.
- All information is freely available
- there are no transaction costs.
- All investors are rational.
- Firms can be grouped into 'Equivalent risk classes' on the basis of their business risk.
- Non-existence of corporate taxes.

Based on the above assumptions, Modigliani-Miller derived the following three propositions:

(i) Total market value of a firm is equal to its expected net operating income divided by the discount rate appropriate to its risk class decided by the market.

Value of levered firm (Vg) = Value of unlevered firm (Vu)

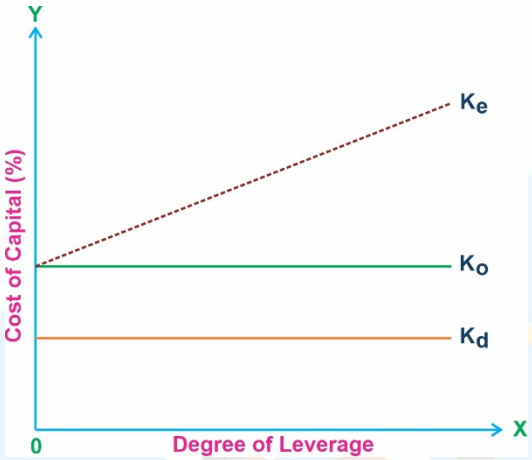
$$Value\ of\ a\ firm = \frac{Net\ Operating\ Income\ (NOI)}{K_0}$$

(ii) A firm having debt in capital structure has higher cost of equity than an un- levered firm. The cost of equity will include risk premium for the financial risk. The cost of equity in a levered firm is determined as under:

$$K_{eL} = K_{eUL} + (K_e - K_d)\frac{Debt}{Equity}$$

(iii) The structure of the capital (financial leverage) does not affect the overall cost of capital. The cost of capital is only affected by the business risk.

$k_{oL} = k_{oUL}$



It is evident from the above diagram that the average cost of the capital (Ko) is a constant and not affected by leverage.

MM Approach- 1963: with tax

- In 1963, MM model was amended by incorporating tax.
- They recognized that the value of the firm will increase or cost of capital will decrease where corporate taxes exist.
- As a result, there will be some difference in the earnings of equity and debt-holders in levered and unlevered firm and value of levered firm will be greater than the value of unlevered firm by an amount equal to amount of debt multiplied by corporate tax rate.
- MM has developed the following formulae for computation of cost of capital (KO), cost of equity (Ke) for the levered firm.

(i) **Value of levered company > Value of an unlevered company**

Value of firm is not independent of its level of leverage and increase due to benefit of tax.

Value of levered company = Value of an unlevered firm + Debt × Tax rate

$$V_{UF} = \frac{EBIT\,(1 - Tax)}{Ko/KeUL}$$

$V_{EL} = V_L - V_D \times$ Tax Rate

(ii) Cost of equity in a levered company

$$(K_{eL}) = K_{eUL} + (K_{eUL} - K_d)\frac{Debt\,(1-tax)}{Equity}$$

Where,
K_{eL} = Cost of equity in a levered company
K_{eUL} = Cost of equity in an unlevered company
K_d = Cost of debt
t = Tax rate
The equity capitalization rate of a livered firm increases with the increase in the leverage but the rate of increase is lower because of existence of corporate tax.

(iii) **WACC in a levered company (K_{oL}) < K_{eUL}**

Where,
K_{eL} = WACC of a levered company
K_{eUL} = Cost of equity in an unlevered company

Arbitrage under MM(I):

- The operational justification of Modigliani-Miller hypothesis is explained through the functioning of the arbitrage process and substitution of corporate leverage by personal leverage.
- Arbitrage refers to buying asset or security at lower price in one market and selling it at a higher price in another market. As a result, equilibrium is attained in different markets.
- This is illustrated by taking two identical firms of which one has debt in the capital structure while the other does not.
- Investors of the firm whose value is higher will sell their shares and instead buy the shares of the firm whose value is lower.
- They will be able to earn the same return at lower outlay with the same perceived risk or lower risk. They would, therefore, be better off.
- The value of the levered firm can neither be greater nor lower than that of an unlevered firm according this approach.
- The two must be equal. There is neither advantage nor disadvantage in using debt in the firm's capital structure.
- No matter how the capital structure of a firm is divided (among debt, equity etc.), there is a conservation of investment value.
- Since the total investment value of a corporation depends upon its underlying profitability and risk, it is invariant with respect to relative changes in the firm's financial capitalization.
- According to MM, since the sum of the parts must equal the whole, therefore, regardless of the financing mix, the total value of the firm stays the same.

The main shortcoming of this approach is that the arbitrage process as suggested by Modigliani-Miller will fail to work because of:

a) Imperfections in capital market
b) Existence of transaction cost and
c) Presence of corporate income taxes.

Case I: Unlevered firm to Levered firm:

When Market Value of unlevered firm is more than similar risk class levered firm, than share holders of Unlevered firm will follow the following steps to make gain without changing their profile:

1) Sell shares from UL firm at market price and buy in the Levered firm along with the risk free lending at corporate rate of interest .
2) Gain = Received Dividend in Levered firm + Interest on Debt of Levered firm – Opportunity Loss of Dividend in Unlevered firm

Case I: Levered firm to Unlevered firm:

When Market Value of levered firm is more than similar risk class unlevered firm, than shareholders of levered firm will follow the following steps to make gain without changing their profile:

1) Sell shares from Levered firm at market price and take personal borrowing at a Corporate risk free rate to maintain the level of their personal leverage of the levered firm .
2) Gain = Received Dividend in Unlevered firm - Interest on Debt of Levered firm – Opportunity Loss of Dividend in Levered firm

CHAPTER EIGHT

FINANCING DECISIONS - LEVERAGES

Business Risk & Financial Risk :

- Risk faced by the common shareholders is primarily of two types, namely business risk and financial risk. Therefore, the risk faced by common shareholders is a function of these two risks, i.e. {Business Risk, Financial Risk}

Business Risk:-

- It refers to the risk associated with the firm's operations.
- It is the uncertainty about the future operating income (EBIT), i.e. how well can we predict operating incomes?
- Business risk can be measured by the standard deviation of the Basic Earning Power ratio.

Financial Risk:-

- It refers to the additional risk placed on the firm's shareholders as a result of debt use i.e. the additional risk a shareholder bears when a company uses debt in addition to equity financing.
- Companies that issue more debt instruments would have higher financial risk than companies financed mostly or entirely by equity.

Debt Versus Equity Financing:

Financing a business through borrowing is cheaper than using equity. This is because:

- Lenders require a lower rate of return than ordinary shareholders. Debt financial securities present a lower risk than shares for the finance providers because they have prior claims on annual income and liquidation.
- A profitable business effectively pays less for debt capital than equity for another reason: the debt interest can be offset against pre-tax profits before the calculation of the corporate tax, thus reducing the tax paid.
- Issuing and transaction costs associated with raising and servicing debt are generally less than for ordinary shares.

Meaning and Types of Leverage:

- Leverage refers to the ability of a firm in employing long term funds having a fixed cost, to enhance returns to the owners.
- In other words, leverage is the amount of debt that a firm uses to finance its assets.
- A firm with a lot of debt in its capital structure is said to be highly levered. A firm with no debt is said to be unlevered.
- The term Leverage in general refers to a relationship between two interrelated variables.
- In financial analysis it represents the influence of one financial variable over some other related financial variable.
- These financial variables may be costs, output, sales revenue, Earnings before Interest and Tax (EBIT), Earning per share (EPS) etc.

There are three commonly used measures of leverage in financial analysis. These are:

i. Operating Leverage
ii. Financial Leverage
iii. Combined Leverage

Chart Showing Operating Leverage, Financial Leverage and Combined leverage

Profitability Statement		
Sales	xxx	
Less: Variable Cost	(xxx)	
Contribution	xxx	Operating Leverage / Combined Leverage
Less: Fixed Cost	(xxx)	Operating Leverage
Operating Profit/ EBIT	xxx	Combined Leverage
Less: Interest	(xxx)	Financial Leverage
Earnings Before Tax (EBT)	xxx	Financial Leverage / Combined Leverage
Less: Tax	(xxx)	
Profit After Tax (PAT)	xxx	
Less: Pref. Dividend (if any)	(xxx)	
Net Earnings available to equity shareholders/ PAT	xxx	
No. Equity shares (N)		
Earnings per Share (EPS) = (PAT ÷ N)		

i. Operating leverage (OL):

- Operating leverage (OL) may be defined as the employment of an asset
- with a fixed cost in the hope that sufficient revenue will be generated to cover all the fixed and variable costs.
- The use of assets for which a company pays a fixed cost is called operating leverage.
- With fixed costs the percentage change in profits accompanying a change in volume is greater than the percentage change in volume.
- The higher the turnover of operating assets, the greater will be the revenue in relation to the fixed charge on those assets.
- Operating leverage is a function of three factors:
  a) Amount of fixed cost
  b) Variable contribution margin and
  c) Volume of sales.

$$Operating\ Leverage\ (OL) = \frac{Contribution(C)}{Eaming\ before\ interest\ and\ tax\ (EBIT)}$$

Where,
Contribution (C) = Sales - Variable Cost
EBIT = Sales - Variable Cost- Fixed Cost

Degree of operating leverage (DOL):

- The operating leverage may be defined as "the firm's ability to use fixed operating cost to magnify the effects of changes in sales on its earnings before interest and taxes."

$$Degree\ of\ Operating\ Leverage\ (DOL) = \frac{Percentage\ change\ in\ EBIT}{Percentage\ change\ in\ Sales}$$

Or,

$$DOL = \frac{\frac{\Delta EBIT}{EBIT}}{\frac{\Delta Sales}{Sales}}$$

Where,
Δ EBIT = Change in EBIT
Δ Sales = Change in Sales

Situation 1: No Fixed Cost

DOL =1

Situation 2: If fixed cost exists:

DOL is more than one, operating leverage exists. More is the DOL higher is operating leverage.

A positive DOL/OL means that the firm is operating at higher level than the breakeven level and both sales and EBIT moves in the same direction.

In case of negative DOL/OL firm operates at lower than the break-even and EBIT is negative.

Situation 3 : When EBIT is Nil (contribution = fixed cost)

DOL = Undefined

ii. Financial Leverage:

- Financial leverage (FL) maybe defined as 'the use of funds with a fixed cost in order to increase earnings per share.'
- In other words, it is the use of company funds on which it pays a limited return.
- Financial leverage involves the use of funds obtained at a fixed cost in the hope of increasing the return to common stockholders.

$$Financial\ Leverage\ (FL) = \frac{Earning\ before\ interest\ tax\ (EBIT)}{Earning\ before\ tax\ (EBIT)}$$

Where,
EBIT = Sales - (Variable cost + Fixed Cost)
EBT = EBIT - Interest

Degree of Financial Leverage (DFL)

- Degree of financial leverage is the ratio of the percentage increase in earnings per share (EPS) to the percentage increase in earnings before interest and taxes (EBIT).
- Financial Leverage (FL) is also defined as "the ability of a firm to use fixed financial charges to magnify the effect of changes in EBIT on EPS.

$$\text{Degree of Financial Leverage } (DFL) = \frac{\text{Percentage change in earning as per share } (EPS)}{\text{Percentage change in earning before interest and tax } (EBIT)}$$

Or,

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

Where,

$\Delta\ EPS$ = Change in EPS

$\Delta\ EBIT$ = Change in EBIT

Situation 1: No Fixed Interest Cost

DFL =1

Situation 2: If fixed interest cost exists:

DFL is more than one (1), financial leverage exists. More is DFL higher is financial leverage.

A positive DFL/ FL means firm is operating at a level higher than break- even point and EBIT and EPS moves in the same direction.

Negative DFL/ FL indicates the firm is operating at lower than break- even point and EPS is negative.

Situation 3: When EBT is nil (EBIT = Fixed Interest)

DFL = Undefined

iii. Combined leverage:

Combined leverage maybe defined as the potential use of fixed costs, both operating and financial, which magnifies the effect of sales volume change on the earning per share of the firm.

$$\text{Combined Leverage } (CL) = \text{Operating Leverage } (OL) \times \text{Financial Leverage } (FL)$$

$$= \frac{C}{EBIT} \times \frac{EBIT}{EBT}$$

$$= \frac{C}{EBT}$$

Degree of combined leverage (DCL).

Degree of combined leverage (DCL) is the ratio of percentage change in earning per share to the percentage change in sales.

- It indicates the effect the sales changes will have on EPS.

$$DCL = DOL \times DFL$$

$$= \frac{\%\text{Change in EBIT}}{\%\text{ Change in Sales}} \times \frac{\%\text{ Change in EPS}}{\%\text{Change in EBIT}}$$

$$= \frac{\%\text{Change in EPS}}{\%\text{ Change in Sales}}$$

Break-Even Analysis:

(i) Operating Break-even Point:

Where, Contribution = Fixed Cost or EBIT=0

$$Break-even\ point\ (in\ units) = \frac{Fixed\ Cost}{Contribution\ per\ unit}$$

In Value =Break-even Units × Sales price per unit

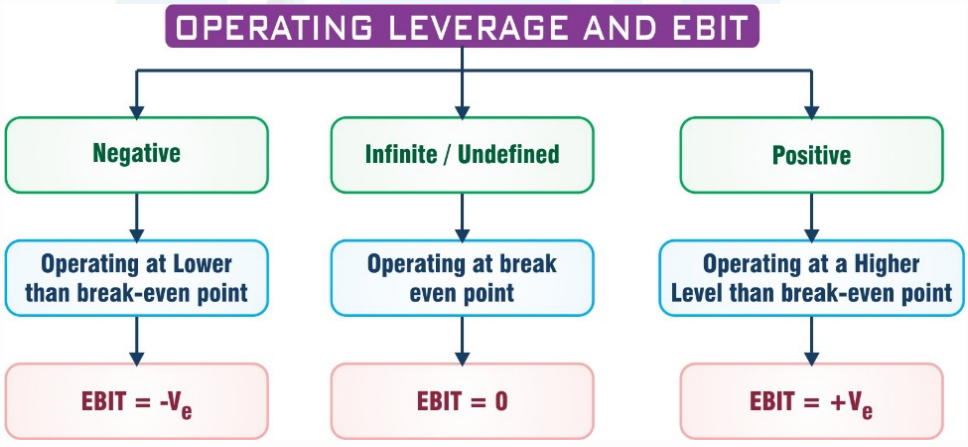
OR Break-even Value = $\frac{Fixed\ Cost}{Contribution\ to\ sales\ Ratio}$

Margin of Safety = Actual Sales – Break-even Sales

The relationship between leverage, break-even point and fixed cost as under:

Leverage	Break-even point
1. Firm with leverage	1. Higher Break-even point
2. Firm with no leverage	2. Lower Break-even point
Fixed cost	**Operating leverage**
1. High fixed cost	1. High degree of operating leverage
2. Lower fixed cost	2. Lower degree of operating leverage

The relationship between operating leverage, fixed cost and EBIT



Analysis and Interpretation of operating leverage

S. No.	Situation	Result
1	No Fixed Cost	No operating leverage
2.	Higher Fixed cost	Higher Break-even point
3.	Higher than Break-even level	Positive operating leverage
4.	Lower than Break-even level	Negative operating leverage

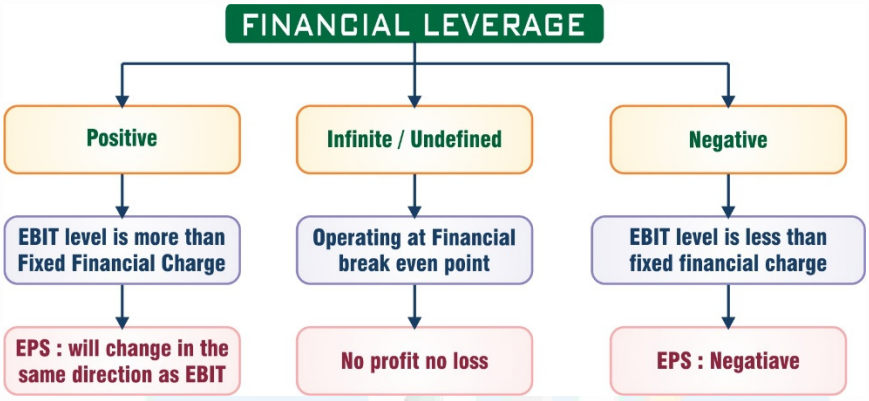
(ii) Financial Break-even Point:

When, EBIT = Interest

 # If preference dividend is given:

Financial BEP= Interest + $\frac{Preference\ Dividend}{(1-tax)}$

The relationship between financial leverage, fixed cost and EBIT



The analysis and interpretation of financial leverage is provided as follows:

Sr. No.	Situation	Result
1.	No Fixed Financial Cost	No financial leverage
2.	Higher Fixed Financial Cost	Higher financial leverage
3.	When EBIT is higher than Financial Break-even point	Positive financial leverage
4.	When EBIT is lower than Financial Break-even point	Negative financial leverage

(iii) Combines BEP:

It is the level of sales at which EPS is 0.

Where, Contribution = Total Operating Fixed Cost + Total Financing Cost
And hence, no profit/no loss for equity shareholders.

$$Break-even\ point\ (in\ units) = \frac{Operating\ Fixed\ Cost + Financing\ Fixed\ Cost}{Contribution\ per\ unit}$$

Break-even Value = $\frac{Operating\ Fixed\ Cost + Finance\ fixed\ Cost}{Contribution\ to\ sales\ Ratio}$

- Like operating leverage and financial leverage, combined leverage can also be positive and negative combined leverage.

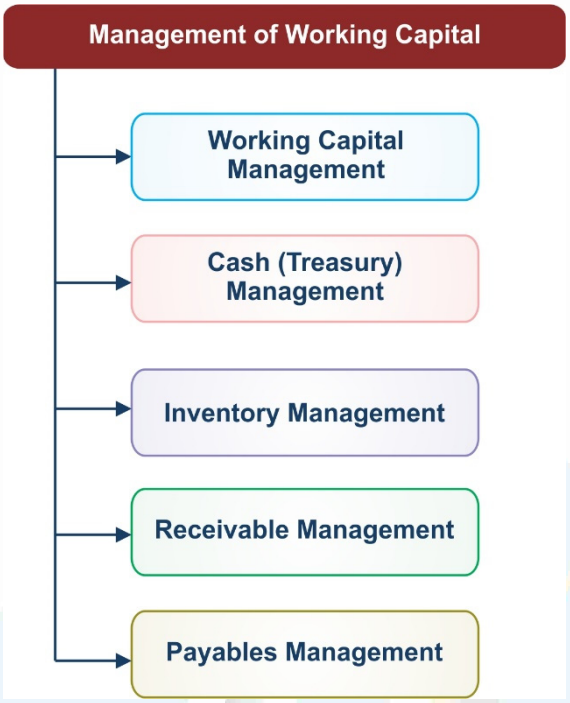
Analysis and interpretation of combined leverage.

Sl. No.	Situation	Result
1	No Fixed Cost and Fixed Financial Fixed Cost	No Combined leverage
2.	Higher Fixed cost	Higher Combined Leverage
3.	Sales level higher than break-even level	Positive combined leverage
4.	Sales leverage lower than break-even level	Negative Combined leverage

NOTES

CHAPTER NINE

WORKING CAPITAL MANAGEMENT



UNIT-I : INTRODUCTION TO WORKING CAPITAL MANAGEMENT

LOS 1 : MEANING OF THE TERM "WORKING CAPITAL"

- In accounting term working capital is the difference between the current assets and current liabilities.
- If we break down the components of working capital we will found working capital as follows:

Working Capital = Current Assets – Current Liabilities

LOS 2 : OPERATING CYCLE

The net operating cycle represents the time interval for which the firm has to negotiate for Working Capital from its Bankers. It enables to determine accurately the amount of working capital needed for the continuous operation of business activities. The duration of working capital cycle may vary depending on the nature of the business.

In the form of an equation, the operating cycle process can be expressed as follows:

Operating Cycle = R + W + F +D – C

Where,

R	=	Raw material storage period.
W	=	Work-in-progress holding period.
F	=	Finished goods storage period.
D	=	Debtors collection period.
C	=	Credit period availed.

LOS 3 : DIFFERENT COMPONENTS OF WORKING CAPITAL

1) Raw Material Storage Period = $\frac{\text{Average stock of raw material}}{\text{Average Cost of Raw Material Consumption per day}}$

2) Work-in-progress holding period = $\frac{Average\ Work-in-progress\ inventory}{\text{Average Cost of Production per day}}$

3) Finished goods storage period = $\frac{\text{Average stock of finished goods}}{\text{Average cost of goods sold per day}}$

4) Receivables (Debtors) collection period = $\frac{\text{Average Receivables}}{\text{Average Credit Sales per day}}$

5) Receivables (Debtors) collection period = $\frac{Average\ Payables}{Average\ Credit\ Purchases\ per\ day}$

LOS 4 : ESTIMATION OF WORKING CAPITAL REQUIREMENTS :

		Amount	Amount	Amount
I	**Current Assets:**			
	Inventories:			
	- Raw Materials	---		
	- Work-in-process	---		
	- Finished goods	---	---	
	Receivables:			
	- Trade Debtors	---		
	- Bills	---	---	
	Minimum cash balance		---	
	Gross Working Capital		---	---
II	**Current Liabilities**			
	Trade Payables			---
	Bills Payables		---	
	Wages Payables		---	
	Payables for overheads		---	---
III	**Excess of Current Assets over Current Liabilities [I-II]**			---
IV	**Add: Safety Margin**			---
V	**Net Working Capital [III + IV]**			---

LOS 5 : ESTIMATES OF VARIOUS COMPONENTS OF WORKING CAPITAL

Estimation of Current Assets

i. Raw Materials Inventory:

- The funds to be invested in raw materials inventory may be estimated on the basis of production budget, the estimated cost per unit and average holding period of raw material inventory.
- It can be calculated using the following formula:

$= \frac{\text{Estimated Production (units)}}{12\ months\ or\ 365\ days*} \times$ Estimated Cost per unit × Average raw material storage period

ii. Work-in-Progress Inventory:

- The funds to be invested in work-in-progress can be estimated by the following formula:

$= \frac{\text{Estimated Production (units)}}{12\ months\ or\ 365\ days*} \times$ Estimated WIP cost per unit × Average WIP holding period

iii. Finished Goods:

- The funds to be invested in finished goods inventory can be estimated with the help of following formula:

$= \frac{\text{Estimated Production (units)}}{12\ months\ or\ 365\ days*} \times$ Estimated cost of production per unit × Average finished goods storage period

iv. Receivables (Debtors):

- Funds to be invested in trade receivables (debtors) may be estimated with the help of following formula:

$= \frac{\text{Estimated Credit Sales (units)}}{12\ months\ or\ 365\ days*} \times$ Cost of Sales (excluding depreciation) per unit × Average receivable collection period

v. Cash and Cash equivalents:

- Minimum desired Cash and Bank balance to be maintained by the firm has to be added in the current assets for the computation of working capital.

Estimation of current liabilities

Current liabilities are deducted from the current assets to get working capital. Hence, the amount of working capital is lowered to the extent of current liabilities (other than bank credit) arising in the normal course of business.

The important current liabilities like trade payables, wages and overheads can be estimated as follows:

i. Trade Payables:

- Trade payable can be estimated on the basis of material purchase budget and the credit purchase. Estimated credit suppliers
- It is given by,

$= \frac{\text{Estimated Credit Purchase}}{12\ months\ or\ 365\ days*} \times$ Credit period allowed by suppliers

ii. Direct Wages:

- It is estimated with the help of direct wages budget.
- It is given by,

$= \frac{\text{Estimated Labour hours}}{12\ months\ or\ 365\ days*} \times$ wages rate per hour × Average time lag in payment of wages

iii. Overheads (other than depreciation and amortization):

- It is given by,

$= \frac{\text{Estimated Overheads}}{12\ months\ or\ 365\ days*} \times$ Average time lag in payment of wages

NOTE: *Number of days in a year may be taken as 365 or 360 days.

LOS 6 : FORMAT OF COST SHEET :

	Amount
Opening Stock of Raw Material	xx
+Purchases	xx
-Closing Stock of Raw Material	xx
Direct Material (Consumed)	xxx
+Direct Labour	xx
+Direct Expenses	xx
Prime Cost	xxx
+Factory Overhead	xx
Gross Work Cost	xxx
+Opening WIP	xx
-Closing WIP	xx
Cost of Production/Net Work Cost	xxx
+Opening Finished Goods	xx
-Closing Finished Goods	xx
COGS	xxx
+Admin Overhead	xx
+Selling & Distribution O/H	xx
Cost Of Sales	xxx
+Profit	xx
Sales	xxx

Note:-

1) In most of the cases, COP/COS/COGS is assumed to be same if no information between them is given.
2) In most of the cases, Raw material consumed & raw material purchases is assumed to be same, if no information between them is given.
3) Manufacturing expenses are the part of cost of production
4) **Administrative Expenses:** As can be seen from above format that Admin expenses are not taken as a part of cost of production, Except
   (i) When question demands.
   (ii) When question ask us to prepare profitability statement.
   (iii) When word "Manufacturing & Administrative Expenses" is used
   (iv) When word "office & Administrative Expenses" is used

Note: For a new project, there will be no opening stock.

Note: Raw material : Raw material Consumed

WIP : Cost of Production

Finished Goods : Cost of Goods Sold

Debtors : Cost of Sales

Creditors : Value at Raw material purchases

Outstanding Wages : Labour Cost

Outstanding Overhead : Direct Expense/overhead

UNIT – II : TREASURY AND CASH MANAGEMENT

LOS 7 : DIFFERENT METHODS WHICH CAN BE USED TO PREPARE A CASH BUDGET.

1. Receipts and Payments Method:

- In this method all the expected receipts and payments for budget period are considered.
- All the cash inflow and outflow of all functional budgets including capital expenditure budgets are considered.
- Accruals and adjustments in accounts will not affect the cash flow budget.
- Anticipated cash inflow is added to the opening balance of cash and all cash payments are deducted from this to arrive at the closing balance of cash.
- This method is commonly used in business organizations.

2. Adjusted Income Method:

- In this method the annual cash flows are calculated by adjusting the sales revenues and cost figures for delays in receipts and payments (change in debtors and creditors) and eliminating non- cash items such as depreciation.

3. Adjusted Balance Sheet Method:

- In this method, the budgeted balance sheet is predicted by expressing each type of asset and short-term liabilities as percentage of the expected sales.
- The profit is also calculated as a percentage of sales, so that the increase in owner's equity can be forecasted.
- Known adjustments, may be made to long-term liabilities and the balance sheet will then show if additional finance is needed.

NOTE:

- It is important to note that the capital budget will also be considered in the preparation of cash flow budget because the annual budget may disclose a need for new capital investments and
- Also, the costs and revenues of any new projects coming on stream will have to be incorporated in the short-term budgets.
- The Cash Budget can be prepared for short period or for long period.

LOS 8 : CASH BUDGET FOR SHORT PERIOD.

Preparation of cash budget month by month would require the following estimates:

a) As regards receipts:

1. Receipts from debtors;
2. Cash Sales; and
3. Any other source of receipts of cash (say, dividend from a subsidiary company)

b) As regards payments:

1. Payments to be made for purchases;
2. Payments to be made for expenses;
3. Payments that are made periodically but not every month;
   (i) Debenture interest;
   (ii) Income tax paid in advance;
   (iii) Sales tax etc.
4. Special payments to be made in a particular month, for example, dividends to shareholders, redemption of debentures, repayments of loan, payment of assets acquired, etc.

Format of cash budget.

.....Co. Ltd.
Cash Budget
Period.....

	Month 1	Month 2	Month 3	.....	Month 12
Receipts:					
1. Opening Balance					
2. Collection from debtors					
3. Cash Sales					
4. Loans from Banks					
5. Share Capital					
6. Miscellaneous receipts					
7. Other Items					
Total					
Payments:					
1. Payment to creditors					
2. Wages					
3. Overheads					
(a)					
(b)					
(c)					
4. Interest					
5. Dividend					
6. Corporate Tax					
7. Capital Expenditure					
8. Other items					
Total					
Closing Balance					
[Surplus(+) Shortfall (-)]					

LOS 9 : Cash Budget for Long Period

The following procedure may be adopted to prepare long-range cash forecasts:

i) Take the cash at bank and in the beginning of the year:

ii) Add:

a) Trading profit (before tax) expected to be earned;
b) Depreciation and other development expenses incurred to be written off;
c) Sale proceeds of assets';
d) Proceeds of fresh issue of shares or debentures; and
e) Reduction in working capital that is current assets (except cash) less current liabilities.

iii) Deduct:

a) Dividends to be paid.
b) Cost of assets to be purchased.
c) Taxes to be paid.
d) Debentures or shares to be redeemed.
e) Increase in working capital.

LOS 10 : Cash Management Models

William J. Baumol's Economic Order Quantity Model, (1952).

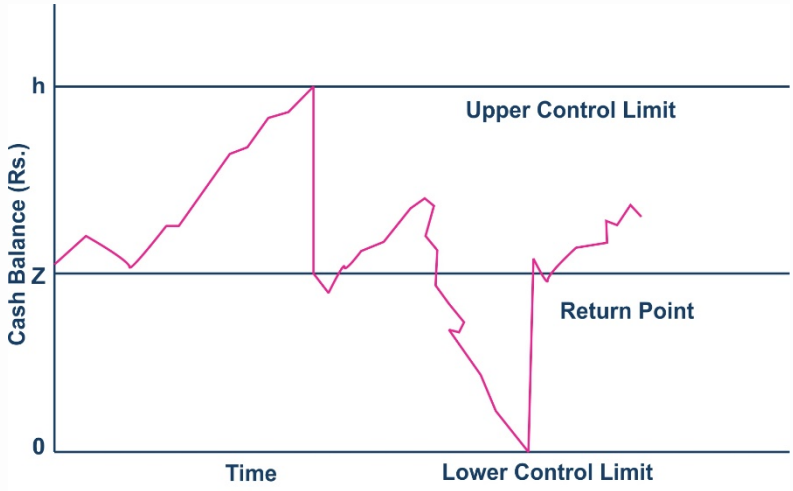
- According to this model, optimum cash level is that level of cash where the carrying costs and transactions costs are the minimum.
- The carrying costs refer to the cost of holding cash, namely, the interest foregone on marketable securities.
- The transaction costs refer to the cost involved in getting the marketable securities converted into cash.
- This happens when the firm falls short of cash and has to sell the securities resulting in clerical, brokerage, registration and other costs.
- The optimum cash balance according to this model will be that point where these two costs are minimum.
- The formula for determining optimum cash balance is:

$$C = \sqrt{\frac{2U \times P}{S}}$$

Where,
C = Optimum cash balance
U = Annual (or monthly) cash disbursement
P = Fixed cost per transaction
S = Opportunity cost of one rupee p.a. (or p.m.)
The model is based on the following assumptions:
(i) C ash needs of the firm are known with certainty.
(ii) The cash is used uniformly over a period of time and it is also known with certainty.
(iii) The holding cost is known and it is constant.
(iv) The transaction cost also remains constant.

Miller-Orr Cash Management Model (1966).

- According to this model the net cash flow is completely stochastic (not known in advance).
- When changes in cash balance occur randomly the application of control theory serves a useful purpose.
- The Miller-Orr model is one of such control limit models.
- This model is designed to determine the time and size of transfers between an investment account and cash account.
- In this model control limits are set for cash balances.
- These limits may consist of h as upper limit, z as the return point; and zero as the lower limit.
  - When the cash balance reaches the upper limit, the transfer of cash equal to h – z is invested in marketable securities account.
  - When it touches the lower limit, a transfer from marketable securities account to cash account is made.
  - During the period when cash balance stays between (h, z) and (z, 0) i.e. high and low limits no transactions between cash and marketable securities account is made.
- The high and low limits of cash balance are set up on the basis of fixed cost associated with the securities transactions, the opportunity cost of holding cash and the degree of likely fluctuations in cash balances.
- These limits satisfy the demands for cash at the lowest possible total costs.



MILLER-ORR CASH MANAGEMENT MODEL

Note:

- The MO Model is more realistic since it allows variations in cash balance within lower and upper limits.
- The finance manager can set limits according to the firm's liquidity requirements i.e., maintaining minimum and maximum cash balance.

UNIT III : MANAGEMENT OF RECEIVABLES

LOS 11 : APPROACHES TO EVALUATION OF CREDIT POLICIES

There are basically two methods of evaluating the credit policies to be adopted by a Company :

1) **Total Approach**
2) **Incremental Approach**

Statement showing the Evaluation of Credit Policies (based on Total Approach)

Particulars	Present Policy (₹)	Proposed Policy I (₹)	Proposed Policy II (₹)	Proposed Policy III (₹)
A. Expected Profit:				
(a) Credit Sales				
(b) Total Cost other than Bad Debts				
(i) Variable Costs				
(ii) Fixed Costs				
(c) Bad Debts				
(d) Cash discount				
(e) Expected Net Profit before Tax (a-b-c-d)				
(f) Less: Tax				
(g) Expected Profit after Tax				
B. Opportunity Cost of Investments in Receivables locked up in Collection Period				
Net Benefits (A – B)				

Advise: The Policy……. should be adopted since the net benefits under this policy are higher as compared to other policies.

Statement showing the Evaluation of Credit Policies (based on Incremental Approach)

Particulars	Present Policy Day (₹)	Proposed Policy I (₹ Day)	Proposed Policy II (₹) Day	Proposed Policy III (₹) Day
A. Incremental Expected Profit:				
Credit Sales				
(a) Incremental Credit Sales				
(b) Less: Incremental Costs of Credit sales				
(i) Variable Costs				
(ii) Fixed Costs				
(c) Incremental Bad Debt Losses				
(d) Incremental Cash Discount				
(e) Incremental Expected Profit (a-b-c-d)				
(f) Less: Tax				
(g) Incremental Expected Profit after Tax				
B. Required Return on Incremental Investments:				
(a) Cost of Credit Sales				
(b) Collection Period (in days				

(c) Investment in Receivable (a x b/365 or 360)				
d) Incremental Investment in Receivables				
(e) Required Rate of Return (in %)				
(f) Required Return on Incremental Investments (d x e)				
Net Benefits (A – B)				

Advise: The Policy .....should be adopted since net benefits under this policy are higher as compared to other policies.

Here

(i) Total Fixed Cost = [Average Cost per unit – Variable Cost per unit] x No. of units sold on credit under Present Policy

(ii) Opportunity Cost = Total Cost of Credit Sales $\times \frac{\text{Collection period (Days)}}{365 \text{ or } 360} \times \frac{\text{Required Rate of Return}}{100}$

LOS 12 : FACTORING

- Factoring is a new concept in financing of accounts receivables. This refers to out right sale of accounts receivables to a factor or a financial agency.
- A factor is a firm that acquires the receivables of other firms. The factoring agency bears the right of collection and services the accounts for a fee.

Types of Factoring :

Non-Recourse Factoring & Recourse Factoring

- **Non-Recourse Factoring**: Normally, factoring is the arrangement on a non-recourse basis where in the event of default the loss is borne by the factor. i.e if there are bad debts, it will be borne by the factor.
- **Recourse Factoring**: In this type of factoring. the risk of bad debt is borne by the client and not factor.

Type 1 : Cost Benefit Analysis

a) Benefits of Factoring

a) Reduction of Bad Debts
b) Reduction in Admin cost
c) Reduction in Debtors collection period which will reduce blockage of funds and will save our opportunity cost of interest (Early Recovery)
{Interest saved due to reduction in Average collection period [Cost of Annual Credit Sales × Rate of Interest × (Present Collection Period – New Collection Period)/360* days]}
d) If company is dependent on Over Draft then it can save interest, if company receives advance from Factor.

b) Cost of Factoring

a) Commission / brokerage
b) Interest paid to Factor if advances taken

Net Benefit of Factoring

Decision :
If net benefit if positive company should go for factoring arrangement.

Note : Debtors collection period = $\frac{Debtors}{Average\ daily\ credit\ sales}$

Type 2 : Effective Cost of Factoring (%age)

$$\text{Effective Cost of Factoring} = \frac{Net\ Cos\ of\ Factoring}{Net\ Advance\ Received} \times 100$$

a) Net Advance received from factor

Annual Credit Sale × DCP = Debtors amount received in advance	xxx
- reserve required	xxx
- commission charged	xxx
Amount of advance	xxx
- Interest on amount of advance	xxx
Net advance received from factor	xxx

b) Net cost of factoring

Factor commission	xxx
+ interest cost	xxx
- Bad Debt saved	xxx
- admin cost saved	xxx
Net cost of factoring	xxx

Advise:

1. The company should avail Factoring services if rate of effective Cost of Factoring to the firm is less than the existing cost of borrowing or if availing services of factoring results in to positive Net Annual **Benefits.**
2. The company should not avail Factoring services if the Rate of Effective Cost of Factoring to the Firm is more than the existing cost of borrowing.

UNIT – IV : MANAGEMENT OF PAYABLES (CREDITORS)

LOS 13 : COMPUTE THE COST OF PAYABLES

- By using the trade credit judiciously, a firm can reduce the effect of growth or burden on investments in Working Capital.
- Now question arises how to calculate the cost of not taking the discount.
- The following equation can be used to calculate nominal cost, on an annual basis of not taking the discount:

$$= \frac{d}{100-d} \times \frac{365\ days}{t}$$

- However the above formula does not take into account the compounding effect and therefore, the cost of credit shall be even higher.
- The cost of lost cash discount can be estimated by the formula:

$$= \left(\frac{100}{100-d}\right)^{\frac{365}{t}} - 1$$

Where,

d = Size of discount i.e. for 6% discount, d=6

t = the reduction in the payment period in days, necessary to obtain the early discount or Days Credit Outstanding – Discount Period.